

A History and Description
of the
Manufacture and Mining of Salt
In New York State

BY
CHARLES J. WERNER

LIBRARY



Presented to the Mission
by C.J. Werner

SMU LIBRARY

SMU LIBRARY



Digitized by the Internet Archive
in 2010 with funding from
Boston Library Consortium Member Libraries

<http://www.archive.org/details/historydescripti00wern>



ABANDONED BLOCK AT SYRACUSE, ONONDAGA COUNTY, N. Y.

From a water color by W. Goodrich Beal

A HISTORY
AND DESCRIPTION
OF THE
MANUFACTURE AND MINING
OF
SALT
IN NEW YORK STATE

BY
CHARLES J. WERNER

Vice-President Independent Salt Co.; Author of Historical Miscellanies Relating to Long Island, and Editor of Thompson's History of Long Island—enlarged edition.

ILLUSTRATED



PUBLISHED BY THE AUTHOR
HUNTINGTON
LONG ISLAND, N. Y.

1917

COPYRIGHT 1917
BY
CHARLES J. WERNER

— TOBIAS A. WRIGHT PRESS, N. Y. —

1130

TN903

05

N77

1917

ONE HUNDRED COPIES PRINTED
OF WHICH THIS IS

Number

SMU LIBRARY

THIS BOOK IS RESPECTFULLY
DEDICATED BY THE AUTHOR TO THE
GENTLEMEN OF THE SALT INDUSTRY IN NEW YORK STATE
WHO HAVE AIDED HIM IN COMPILING THIS
HISTORY AND DESCRIPTION

CONTENTS

	PAGE
CHAPTER I.—Introduction,	11
CHAPTER II.—Onondaga County,	15
CHAPTER III.—The Old Salt Works of Cayuga County,	44
CHAPTER IV.—Wayne, Delaware and Monroe Counties,	50
CHAPTER V.—Wyoming County,	55
CHAPTER VI.—Genesee County,	87
CHAPTER VII.—Livingston County,	105
CHAPTER VIII.—Schuyler County,	121
CHAPTER IX.—Tompkins County,	129
CHAPTER X.—Western New York Salt Manufacturers Association, and National Salt Company,	135
CHAPTER XI.—International Salt Company and Independent Salt Company,	138
CHAPTER XII.—Grades of Salt,	142

LIST OF ILLUSTRATIONS

Abandoned Block at Syracuse	Frontispiece
Cooper's Works, City Island	facing p. 14
Syracuse Works, 1850	" 40
Warsaw Salt Co.	" 61
Le Roy Salt Co.	" 96
Head House, Retsof Mine	" 105
Royal Salt Co.	" 117
International Salt Co., Glen Plant	" 123
International Salt Co., Cayuga Plant	" 131
Interior of Retsof Mine	" 138
Mining Salt at Retsof	" 143

PREFACE

IT has always been the opinion of the author, shared by others, that the records should be preserved of an industry which has contributed so much to the growth of New York State, as the mining and manufacture of salt has done. With this idea in mind he has, since his connection with the salt industry, discovered and collected a great amount of historical and descriptive data on the several mines and evaporating plants throughout the State. This information has been made into a narrative and divided into counties, prefaced by an introductory chapter giving a general view of the development of the industry and showing the relation of the different periods one to another.

The position of the author, an officer of a large selling company taking tonnage from almost all the plants in the State, puts him in a peculiarly fortunate position for the discovery and receipt of information, inasmuch as a friendly intercourse with the officers of the different companies operating throughout the State has enabled him to secure valuable particulars of the growth of their respective plants and of the industry in general.

To these gentlemen the author is deeply indebted and takes this opportunity to extend his thanks for information supplied. More particularly he desires to thank Mr. Mortimer B. Fuller, President of the International Salt Co., and Mr. John Samson, Treasurer and General Manager of the LeRoy Salt Co., who have been most painstaking in supplying particulars of the industry and of their respective companies. Thanks are also due to Mr. Warren W. Clute, President,

P R E F A C E

Watkins Salt Co., Mr. Lorenzo Benedict, President, Worcester Salt Co., Mr. F. M. Relyea, Manager, Rock Glen Salt Co., Mr. C. L. Paar, Sales Manager, International Salt Co., Mr. Thos. Chisholm, Traffic Manager, International Salt Co., Mr. Mark Calkins, Warsaw, N. Y. and Mr. H. D. Sleight, Editor of the Sag Harbor *Corrector*, Sag Harbor N. Y.

Several illustrations have been included of the different works and in a few cases reproductions of old prints have been made. A map of the State has also been inserted, showing the location of the old and present day plants.

The book is now given to the public in the hope that it may perpetuate the endeavors of the pioneers of the industry; give to the reader an idea of its growth and supply a description of the present state of this important aid and cause for the development of certain parts of our Empire State.

Huntington, Long Island, N. Y.

October 23d, 1917.

Salt Industry in New York State

Chapter I.

INTRODUCTION

THE earliest settlers on the Atlantic seaboard were accustomed to make sufficient salt for their needs from sea water.

This, in truth, was a rather laborious undertaking, as the percentage of salt that can be extracted from the ocean is small and the pioneers were of necessity limited to crude methods of manufacture.

The practice was persisted in, however, as salt from the old countries was expensive and ocean freights high. There is no doubt that small quantities were made by almost every band of settlers from New England to Florida, but as this book treats of New York State only, we shall confine our observations to the contiguous territory.

The first attempts from 1621 to 1623, on the Massachusetts coast, were under governmental control. Not much was done, however, until private enterprises successfully established the business of salt making at Salem in 1636. Other localities followed suit and quite a few establishments grew up along the New England coast from Maine to Connecticut.

The first salt making within the bounds of New York State of which we have record was done by Dirck De Wolf in 1661 at Coney Island. He had obtained from the authorities at Amsterdam, Holland, the exclusive privilege of making salt for seven years in the Dutch colony of New Netherland, and in the year and place above named, commenced operations. His system was to fill shallow wooden vats or troughs with sea water at high tide and allow the sun's rays to evaporate the salt. His works, however, were upon land claimed by the settlers of the town of Gravesend and he was regarded by them as a trespasser. In spite of a military guard sent by Governor Peter Stuyvesant to protect him, he was obliged to desist and give up the enterprise.

When the War of the Revolution broke out in 1776, one of the things it did was to make salt extremely scarce and expensive. Importations were cut off and domestic manu-

facture restricted; one of the aims of the British troops being to destroy salt plants wherever they came across them. Consequently salt went as high as \$8.00 a bushel, and scarce at that.

This state of affairs caused the Americans great concern, as salt was essential to their existence then as now. Commissioners were appointed to collect and conserve a supply, also to encourage further manufacture. These were Matthew Cantine, William Harper and Major Jonathan Lawrence. On July 30th, 1776, the Provincial Convention of New York offered to loan £500 to the first five persons who would manufacture salt from sea water, and only two days later Col. Marinus Willett, a distinguished Revolutionary personage, Alexander Robertson, Peter Sim and two others obtained the loan. They established works at the neighboring villages of Huntington and Cold Spring, on Long Island. The undertaking was short-lived, as the disastrous Battle of Long Island during the last week in August, 1776, gave the British possession of this territory and Willett and his associates had to quit.

An attempt was made in 1778 by Peter Sim to get salt from the springs at Onondaga, but hostile Indians and an active enemy prevented. It is believed that Lindley Murray, the famous scholar and grammarian, made salt at Islip, Long Island, while living on the estate of Judge Isaac Thompson; but Murray was a Tory and the salt probably went to the British.

For many years salt works were in operation near the village of Sag Harbor, Long Island, on a peninsula known as North Haven, fronting on Shelter Island Sound. The date of their establishment is uncertain, but the late Henry P. Hedges, an authority on local history, thinks they were there during the Revolution, if not before. On December 3rd, 1779, Sergeant Hugh Gelston brought 300 bushels of salt from the eastern end of Long Island to Connecticut. Concerning this transaction Judge Hedges says.* "I think Gelston was going to get this salt from the old salt works on Hog Neck (North Haven), located on or near the old Mitchell farm, lately owned by Samuel L. Gardiner, deceased, and probably operated in the Revolutionary time or before. The salt was produced by evaporation of salt water."

I agree with Hedges' supposition, as 300 bushels was quite a large amount of salt to get, except from a place where it was manufactured. We know that the salt was made by solar evaporation.

* F. G. Mather's Refugees from L. I. to Conn., p. 356.

As a result of some inquiries on this subject made by the author, the following reply was received from Mr. H. D. Sleight, well versed in local history and proprietor of the "Corrector," Sag Harbor's oldest existing newspaper, founded in 1822:

"It is a matter of common knowledge to old inhabitants of Sag Harbor and vicinity that Salt Works were located on North Haven, a peninsula, just northwest of Sag Harbor village, early in the nineteenth century. I have had it from my grandmother, Anna Charlotte Sleight, who died a few years since, at the age of ninety-four, that the Salt Works were located on the east shore of North Haven, on Shelter Island Sound, near the summer colony now settled by a number of prominent New York actors. There are some here who even today when speaking of the spot refer to it as 'the old Salt Works Landing.'

"The late Hon. H. P. Hedges of Sag Harbor, and Bridgehampton, L. I., who died in 1912, aged ninety-six, says in his historical address delivered before the Sag Harbor Historical Society, February 4, 1896:

'The Salt Works, on North Haven, was a part of the landscape from Sag Harbor, in my early days.'

"I cannot give you any detailed account of how salt was extracted from the salt water of the bay, but it must have been by sun drying, as, so far as I know, only primitive methods were used at that period."

"The Sag Harbor whale ships used large quantities of salt foods on their long voyages, and the necessity of providing a source of supply close to the port, probably appealed to the pioneers in the whale fishery. The whale ships often anchored off the Salt Works, and the anchorage ground was called 'Indian Jail,' and goes by that name today, for native Montauk and Shinnecock Indians, who, after landing from whaling voyages, became drunken and unruly, were confined in the ship's brig at this spot. There were candle works in Sag Harbor at that time, sugar refineries, and all the shops such as smithys, coopers, riggers, and rope walks, needed to outfit the whale ships. In fact the community was self-sustaining in the matter of outfitting the whaling fleet."

The manufacture of salt here was kept up as late as 1849, or perhaps even later, although the industry was losing ground, due probably to the fact that Onondaga salt could be brought here as cheap or cheaper than the home product. Benjamin F. Thompson, in his "History of Long Island," third edition, written in 1849, says:

"The making of salt by solar evaporation, as formerly

practiced, has not been found profitable enough to warrant its continuance, and very little, if any, is now made here."

E. C. Cooper maintained a small solar plant on City Island, now included in New York City, about 1830. Nothing can be learned of this enterprise except the above meager facts. The attempt did not last very long.

The foregoing instances of early salt-making are interesting, but they were not important or lasting, and for the first permanent manufacture of salt in the State we must look to the Onondaga field, established in the latter years of the eighteenth century, and treated of in Chapter II of this book.

For over eighty years the Onondaga district held undisputed sway, and if we except the rather transient endeavors in Cayuga and other counties in the central part of the State, we may say that it was the only source of supply until 1878.

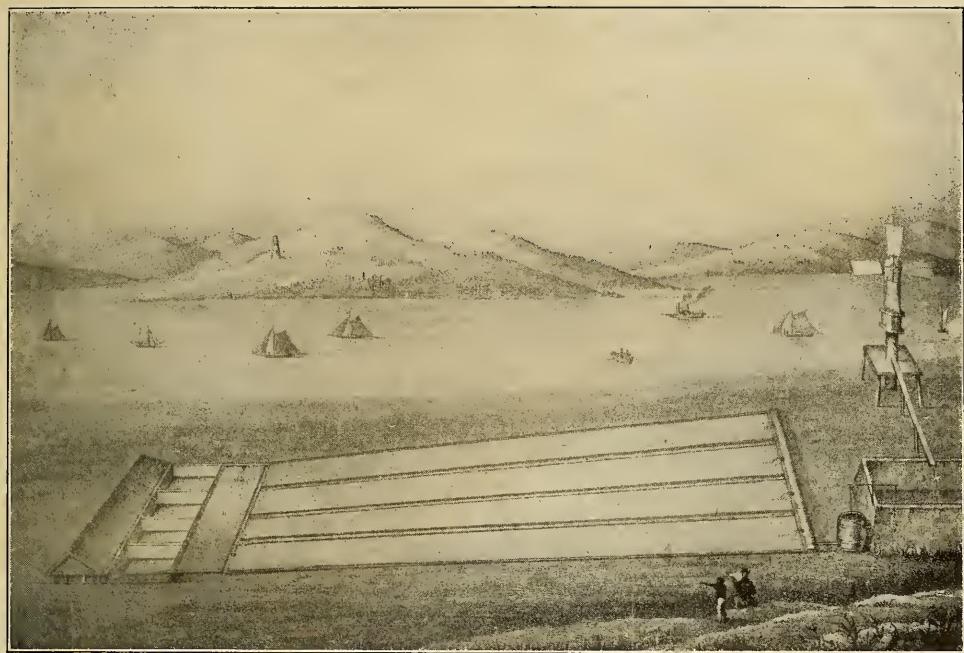
In that year rock salt was found in Wyoming County and people realized that they had "struck oil." Numerous plants sprung up in this and the neighboring counties in the next ten or twelve years and folks believed that this quick and large expansion was permanent. Capitalists and investors greatly overestimated the amount of salt that could be consumed, and as a result, overproduction was the order of the day. We might say that about 1893 marked the peak of the industry so far as number of plants was concerned. After this date, overproduction and ruinous competition stalked abroad and forced many of the plants to shut down.

It was many years before the industry recovered, and the hard times are well within the memories of all but the younger men in the business.

For the last ten years perhaps, salt-making has been on a firm business basis. The concerns now in existence are fully able to produce enough salt for all demands—the chaff has been weeded out, and those now in the game can devote their time towards keeping up the quality of their product and general improvement; unharassed by doubts whether half their yearly tonnage might not remain in the bins.

The lesson has been learned; let us not forget the teaching and lapse into the errors of the past! Don't make more than you can sell. Remember that overproduction means a loss of money to some one.

In view of the above facts, we can truthfully say that the salt business does not offer any inducements for those desiring to "get rich quick." It is a long, hard row to hoe and success is the reward *only* of those who plod along, make a good grade of goods and are content with a fair profit. Just so much salt is used and parties thinking of investing in new salt enterprises had better buy Liberty Bonds.



E. C. COOPER'S SOLAR WORKS AT CITY ISLAND, N. Y.

From an old print circa 1830

Chapter II.

ONONDAGA COUNTY

IT is indeed fitting that this book should open with an account of the salt works of Syracuse in Onondaga County, for the discovery of salt at this place was the direct cause of the settlement and phenomenal growth of the city of Syracuse which today has a population of 146,583 and is the fourth city in point of size in the state. Besides bringing settlers to this part of the country the salt works were in some degree responsible for the digging of the Erie Canal in order that the salt might be more easily brought to the great markets. James Geddes, one of the pioneer manufacturers of salt in the county, made the survey for the canal and was the engineer of the work during its construction.

To properly begin the story of the salt works we must go back to the middle of the 17th century, at which time the first attempts at settling this country were made.

The French, who were established in Canada, at a very early date saw the necessity of obtaining the friendship of the Indians upon whose territories their settlements bordered, both for their own protection and to secure the savages as allies against the English or any other nation which might attempt to colonize the New World. Therefore, at an early date, about 1642, they began sending Jesuit missionaries to instruct and placate the Indians. It was these Jesuit priests who first discovered the salt springs.

The order of Jesuits was founded in 1540 for the purpose of strengthening and spreading the Catholic faith throughout the world and more particularly to carry it to the heathen. Their zeal in this work was wonderful to behold and working in an uncharted wilderness, they endured hunger, cold, torture and perhaps death by the savages in order to accomplish their purpose. They did much good among the Indians of Canada and the West and their discoveries and explorations were of great value. One of their number, Father Marquette, is famous as the discoverer of the Mississippi river.

Some of these missionaries traversed the country south of Lake Ontario and the St. Lawrence river and one of their number, Father Jerome Lallemont, made the first mention of the salt springs in his "Relation" of 1645-46, wherein he states that "The fountain from which very good salt is made, springs up in a beautiful plain surrounded by a fine wood.

At eighty or one hundred paces from this salt spring is another one of fresh water, and these two take their birth from the bosom of the same hill." From this minute description of the locality it is evident that Lallemont personally saw the springs, but for some reason the news of it was not carried to the outside world, nor was there any attempt at salt making.

It remained for Father Simon Le Moyne to spread the news of the discovery and to make the first salt from the brine.

Le Moyne came to Onondaga in 1653 with a party of Huron and Onondaga chieftains for the purpose of making a treaty of peace between those two warring tribes and it was during this visit, on August 16, 1653, that he visited the springs and made the salt. In his relation he states that "We arrived at the inlet of a small lake (Onondaga) in a great basin half dry. We tasted the water of a spring which they (the Indians) dared not drink, saying that there was in it a demon which rendered it fetid, and having tasted it, I found that it was a fountain of salt water; and in fact we made from it salt as natural as that from the sea, of which we carried a specimen to Quebec."

This first manufacture of salt in New York State by Le Moyne in 1653 happened 45 years after Champlain founded the first French settlement in America at Quebec in 1608; 46 years after the first permanent English settlement at Jamestown, Virginia, which preceded the French effort by only a year, and only 27 years after Peter Minuit bought Manhattan Island from the Indians for \$24.00, upon which he started the first settlement of any kind within the borders of our State.

When Le Moyne brought the news of his discovery to the stolid Dutch inhabitants of New Amsterdam, the news was of such a startling and unexpected character that those worthies immediately pronounced it a "Jesuit lie."

The next mention of the salt springs is by Father Francis Creuxius who, besides being a Jesuit, was a Latin writer of some note. His relations were published in Paris in the year 1674 under the title of "A History of Canada and New France, in Ten Books to the Year 1656." In Book 10, page 759, we find the following reference to the salt springs: "Two fountains intersect the meadow, about one hundred yards from each other. The salt water of the one, furnishes an abundance of the best of salt, and the clear, pure water of the other is excellent for drinking, and what is truly wonderful, each bubbles up from the same hill."

This description is almost identical with that of Father Lallemont, particularly in regard to the two springs being one hundred yards apart and arising from the same hill. It is therefore certain that both travelers viewed the same springs.

Father Charlevoix, in Book 1 of his "Relations," page 270-1, states that "Seven or eight leagues west of Oneida, between two beautiful prairies, is situated the canton of Onondaga, contiguous to a beautiful lake, called Ganentaha, about which there are many salt fountains, the shores of which are always covered with very fine salt."

Besides the authors already quoted, the following missionaries left records concerning the Onondaga country and the salt springs. They were Fathers Le Mercier, Dablon, Cholonec, Quien, Le Jeune and Ragueneau.

From the discovery of the springs by the Jesuits and their demonstration of salt manufacture from the brine, the Indians learned to make their own salt and frequently carried it to Albany and the French settlements in Canada, where they offered it for sale.

At the time of the first appearance of the white settlers, the spring was located upon the marsh land just east of the swamp at the head of Onondaga lake. The Indians had excavated a large hole here which was constantly filled with brine up to the surface of the ground and it was from this shallow well or spring that they made their salt. The point at which this spring arose was directly in the rear of the old Salina Pump House, erected in 1841 at a cost of \$30,000. This location is now included in the first ward of the City of Syracuse.

As trappers and traders began to roam through this territory one of their important resting places was at the head of Onondaga lake, where they joined with the Indians in the manufacture of salt for their own immediate uses. Some of this salt sometimes found its way to Albany, New York, or Quebec, and gradually the fame of the salt springs became known to the general public.

In 1770 salt was in common use among the Delaware Indians, and we know that during the Revolution salt was much in demand and brought a high price.

Joshua V. H. Clark, in his well-known History of Onondaga County, states that in 1770 a party of Delaware Indians brought a quantity of salt to the house of Judge Bowker at Colchester, who had formerly seen it made at Onondaga lake by the Indian squaws.

About this time Sir William Johnson, who was appointed Superintendent of Indian Affairs in the Colonies by the British Government, became cognizant of the salt springs and purchased a tract of land from the Indians a mile wide entirely encircling Onondaga Lake and including the salt springs. Sir William Johnson was perhaps the most able and influential man connected with the colonial government at that time and

his purchase of the salt lands was only another evidence of his wonderful foresight, for he undoubtedly saw that at some future time the salt springs would be a source of immense wealth to the owner of the land. Sir William died in 1774 and his son, the notorious Sir John Johnson, sided with the British on the outbreak of the Revolutionary War and all the Johnson property, including the salt lands, was confiscated by the patriot government and Sir John himself was forced to flee to Canada.

Up to 1788 the salt was made in this desultory fashion, each one making enough salt to supply his wants for the time being or enough to make a small shipment to the centers of population already mentioned. The method generally employed was to suspend an iron kettle containing the brine, from a tripod of wooden poles. A fire was built under the kettle and the heat of the fire evaporated the water, leaving a deposit of salt at the bottom of the vessel. After drying, this crude product was ready for use.

1788 a treaty was made with the Onondaga Indians in which they ceded to the State all their lands except a tract set apart for their residence and known as the Onondaga Reservation. By this agreement the State became possessed of all the salt lands although the Indians were given the privilege of making as much salt from the springs as they might need for their own use without charge or interruption.

The State therefore became the owner of these lands upon which the first systematic manufacturing of salt was begun in 1788 the same year that the treaty was signed. It must be remembered, however, that the early salt makers took out no leases for these lands until some years later when the Salt Springs Reservation was formed.

During the spring of 1788, at the age of twenty-three years, Col. Comfort Tyler came into the Onondaga country with Major Asa Danforth and both settled near the southern shore of Onondaga Lake. Except for a trader by the name of Ephraim Webster, they were the first white persons to come into the territory which is now included in Onondaga County.

Both had seen military service in the Revolution and were strong courageous men well adapted to be the pioneers in a new and unsettled country. Their nearest neighbor was Judge White, fifty miles away at Whitesboro. The Indians at that time, as we have already noted, were making a small quantity of salt for their own use and they offered to show Col. Tyler the location of the springs in order that he might make his own salt. Accordingly, in May, 1788, he accompanied an Indian guide to the shores of the lake and having been shown the spring he made a quantity of salt which he brought

back to his residence. Col. Tyler related his experiences in a letter to Dr. Jeremiah Van Rensselaer, who published it in his "Essay on Salt." Col. Tyler in his letter says: "In the month of May in the same year (1788) the family wanting salt, obtained a pound from the Indians, which they had made from the water of the springs upon the shore of the lake. The Indians offered to discover the water to us. Accordingly, I went with an Indian guide to the lake, taking along an iron kettle, of fifteen gallons capacity; this he placed in his canoe and steered out of the mouth of Onondaga Creek, easterly, into a pass, since called Mud Creek. After passing over the marsh, then flowed by about three feet of water, and steering towards the bluff of hard land (in the old village of Salina) he fastened his canoe, pointed to a hole, apparently artificial, and said there was the salt." At this visit Col. Tyler informs us that he made thirteen bushels of rather inferior salt in about nine hours.

He revisited the springs soon after in company with Major Danforth and the two brought with them a large kettle which they suspended by a chain from a horizontal rail placed between two crotched poles set upright in the ground.

It is interesting here to note that Clark, in his History of the County, says that it was related that Major Danforth, using his coat as a pad, carried the kettle the whole distance from his home at Onondaga Hollow to the springs without once taking it off to rest.

With this rude contrivance they boiled enough salt for their immediate wants and hid the kettle and chain in the bushes until they were needed again. This manner of making salt was continued until the following year.

Nathaniel Loomis, during the fall of 1789, came to Onondaga by way of Oneida Lake and river and brought with him in his boat a few kettles in which during the fall of 1789 and winter of 1790, he made about five or six hundred bushels of salt which he sold at a dollar a bushel. This is the first instance of salt made by the white settlers being offered for sale, for so far as we know, Col. Tyler and Major Danforth made salt only for their own use. Later on, William Van Vleck and Jeremiah Gould made salt at Salt Point in caldron kettles placed in stone arches. These were the first to set up their kettles in this manner which later became universal. In 1793 Moses De Witt and Mr. Van Vleck entered into partnership and placed four kettles in a stone arch and manufactured enough salt to supply the inhabitants of the surrounding country. In 1791-1792 a tract of land was set apart by the State and divided into lots to be given to soldiers who had served their country in the Revolutionary War. This tract

was known as the Military Bounty Lands or Military Tract. At the time these lands were laid out the Surveyor General was directed to reserve a sufficient amount of territory to secure all the salt lands around Onondaga Lake, in order that they might not be included in the military tract, but preserved for the manufacture of salt. This fact is interesting, as it is the second instance of the salt lands being recognized by the State, the first instance being in the treaty between the Indians and the State for the cession of their lands, as we have already mentioned.

About this time many settlers came into this locality and it gradually became known as the village of Salina,* most of them coming with the intention of entering into the manufacture of salt. The brine was at first dipped up from the wells in pails and carried to the kettles by hand, but in 1790 this method was changed and a pump was erected with open troughs leading to the different establishments. Each manufacturer at first pumped enough brine for his individual use from the common pump, but later pumbers were employed whose sole duty was to keep each maker supplied with plenty of brine. As the number of manufacturers increased, the distance from the pump to their "blocks," as the works began to be called, became greater, and this difficulty was overcome by constructing crude wooden pipes in which the brine was pumped to the blocks. Later each block or collection of blocks had its own pump.

Besides the wells at Salina, James Geddes began the manufacture of salt on the southwestern shore of the lake in 1794, at a spot which later became known as the village of Geddes; named after its founder. James Geddes, as we have mentioned before, was one of the staunchest supporters of the project for building the Erie Canal, and when the work of building the canal was finally started, he was appointed chief engineer of the operations. He was undoubtedly one of the most influential and sagacious pioneers of the country, and perceiving the great future of salt, he entered upon its manufacture early in the spring of 1794, having brought the necessary kettles by way of Seneca Lake.

In 1795 John Danforth began the manufacture of salt at Liverpool, near the northern end of the lake, and thus we see that there was a complete string of salt works along the lake, starting at Liverpool on the north, including Salina at the southern extremity, and ending at Geddes on the southwestern shore.

It is interesting to note here that the first school in Liver-

* Place where salt is made.

pool, in 1797, was taught by a Capt. Conker at one of the salt blocks, which at that time contained four kettles, and the school was taught while the block was in full operation. Verily the education of the young in those days was fraught with many difficulties!

In a short time the industry began to be of considerable importance and the number of manufacturers rapidly increased. In 1797 the Legislature of the State took cognizance of the facts and instructed the Surveyor General to lay out a tract of land to be known as the Onondaga Salt Springs Reservation, and to lease these lands to all those desirous of engaging in the manufacture of salt. A superintendent was appointed who had general charge over all operations on the reservation and collected the tax of four cents a bushel which was imposed on all salt manufactured.

The original reservation consisted of 15,000 acres. This tract at that time was considered to be larger than there would ever be need for, and consequently in 1822 and 1827 a large amount of the land was sold. However, as the industry increased it was found necessary to repurchase part of this land, and in addition a large number of solar works were erected on private property.

The reservation was laid out by the Surveyor General into lots of ten acres each; each lot taking with it five acres of salt marsh for the convenience of those engaged in salt manufacture. These lots were leased by the State to the salt manufacturers, without charge except for the tax on the amount of salt made, for a period of three years, with option of renewal, and the leases were subject to the following conditions:

For a lease to be valid it was necessary for the lessee to make at least ten bushels of salt annually for every kettle or pan used. This condition was imposed in order to keep every manufacturer in active operation, but it was merely nominal, as every one of them could very easily make a far greater quantity of salt than this per year. The rent for the lots was in the nature of a tax on the amount of salt made and was fixed at four cents per bushel for every bushel of salt made during the life of the lease.

If the springs or wells on any one of the lots should yield more brine than could be used by the manufacturer on that particular lot, the excess brine might be led to the adjoining manufacturer, and if there should be a surplus left by the second user this surplus could be led to other lessees until it was exhausted.

The superintendent was authorized to assign to the lessees a portion of the salt marsh bordering on the lake for the pur-

pose of "cutting grass or sedge" on this land and also for the digging of canals from the works to the lake, in order that the product might be more easily transported to the outer world. In connection with this it must be remembered that quite a good portion of the salt was carried away in boats through the lake and connecting rivers.

The Legislature was empowered to take over any of the works erected, at the expiration of the three-year leases, upon payment to the owners of the value of their works, or else the leases might be renewed on the same terms for a period of seven years, which would bring the date of expiration to 1826. In 1826 the leases were renewed for a period of thirty years ending in 1859, when they were extended for another thirty years ending in June, 1889. Their disposition after that date will be touched on later. A severe punishment was meted out to anyone who should occupy any land without a lease.

The price of salt was fixed at sixty cents a bushel and a penalty was imposed on all who violated this rule and charged more.

The Legislature authorized the expenditure of the sum of two thousand dollars for the erection of a public storehouse and wharf. No salt could be sold at the individual works, but all the salt made was packed in barrels and cases upon which was stamped the maker's name and the quantity of salt contained therein, and transported to the public storehouse, where it was kept until sold.

The duties of the superintendent were clearly defined and his opinion was to be final in all disputes. He was authorized to store all salt made by the several manufacturers and brand upon each and every barrel his name and the year of manufacture. As the respective owners of the salt sold their product, the superintendent turned over to them for delivery the amount sold upon payment to him of the tax of four cents per bushel plus a storage charge of a cent a bushel, which made the net price obtained by the makers 55 cents a bushel. He could also, if he chose, sell the salt himself at the lawful price of 60 cents per bushel and turn the proceeds over to the makers less the tax and storage charge.

The stock of salt on hand was never allowed to run lower than two thousand bushels, and after the first year this reserve was increased five hundred bushels each year. This was done to take care of the wants of the fast growing population of that newly opened territory who depended entirely on the Onondaga works for their supply.

The superintendent sometimes issued certificates for salt

deposited and these were often bought and sold, giving to the storehouse some of the characteristics of a bank.

An old block-house built for defense in 1794 was the first building used for the purposes of a storehouse. William Stevens was the first superintendent and was appointed on June 20th, 1797, during which year there was made and inspected 25,474 bushels. We append here a list of the superintendents from 1797 up to 1904. The amount of salt made and inspected each year is also given, and this table will show as nothing else can the tremendous growth of the industry up to about 1885 and its decline from that year. The chief cause of this decline was due to the discovery of rock salt in Wyoming County and its subsequent manufacture throughout the State. The newly discovered beds of rock salt supplied brines of a much greater strength than the Onondaga springs and it was possible to employ more efficient methods of evaporation than could be profitably used in connection with the Onondaga brine.

During the first two or three years after the formation of the reservation, most of the salt made was consumed by the settlers in the neighborhood of the springs. However, a small quantity made its way to Utica and the villages along the Seneca river and the different lakes, being carried there by means of boats plying on these waters; transportation by water being the cheapest and most efficient method of carrying freight in those days, when railroads, canals or even good roads were unknown in that part of the State.

As the business increased the stringent laws first enacted were replaced by others calculated to foster the growing industry and which enabled the manufacturers to carry on their business in a more efficient and progressive manner.

In 1798 an organization was formed known as the Federal Company, for the purpose of manufacturing salt on a larger scale than had heretofore been attempted. A building of large proportions for that time was erected, which contained thirty-two kettles set up in eight arches containing four kettles each. Up to this time the original well had supplied brine to all, but a new well, about thirty feet deep, was dug for the Federal Company, a slight distance northwest of the original one.

The Federal Company consisted of the following men: Elisha Alvord, Asa Danforth, Jedediah Sanger, Daniel Keeler, Thomas Hart, Ebenezer Butler and Hezekiah Olcott. This company erected the first permanent building for the manufacture of salt and was the largest producer of the product in the reservation at that time.

About two years later Elisha Alvord and his brother

STATEMENT OF THE NUMBER OF BUSHELS OF SALT MADE AND
 INSPECTED AT THE ONONDAGA SALT SPRINGS RESERVATION SINCE
 JUNE 20, 1797, WHEN THE FIRST LEASES OF LOTS WERE MADE

DATE	Solar	Fine	Aggregate bushels	Superintendent
1797.	25,474	25,474	25,474	William Stevens
1798.	59,928	59,928	59,928	William Stevens
1799.	42,704	42,704	42,704	William Stevens
1800.	50,000	50,000	50,000	William Stevens
1801.	62,000	62,000	62,000	Sheldon Logan
1802.	75,000	75,000	75,000	Asa Danforth
1803.	90,000	90,000	90,000	Asa Danforth
1804.	100,000	100,000	100,000	Asa Danforth
1805.	154,071	154,071	154,071	William Kirkpatrick
1806.	122,577	122,577	122,577	William Kirkpatrick
1807.	175,448	175,448	175,448	P. H. Ransom
1808.	319,618	31	,618	Nathan Stewart
1809.	128,282	128,282	128,282	John Richardson
1810.	452,050	452,050	452,050	William Kirkpatrick
1811.	200,000	200,000	200,000	William Kirkpatrick
1812.	221,011	221,911	221,911	William Kirkpatrick
1813.	226,000	226,000	226,000	William Kirkpatrick
1814.	295,000	295,000	295,000	William Kirkpatrick
1815.	322,058	322,058	322,058	William Kirkpatrick
1816.	348,655	348,655	348,655	William Kirkpatrick
1817.	408,655	408,655	408,655	William Kirkpatrick
1818.	406,540	406,540	406,540	William Kirkpatrick
1819.	548,374	548,374	548,374	William Kirkpatrick
1820.	458,329	458,329	458,329	William Kirkpatrick
1821.	526,049	526,049	526,049	William Kirkpatrick
1822.	481,562	481,562	481,562	William Kirkpatrick
1823.	726,988	726,988	726,988	William Kirkpatrick
1824.	816,634	816,634	816,634	William Kirkpatrick
1825.	757,203	757,203	757,203	William Kirkpatrick
1826.	811,023	811,023	811,023	William Kirkpatrick
1827.	983,410	983,410	983,410	William Kirkpatrick
1828.	1,160,888	1,160,888	1,160,888	William Kirkpatrick
1829.	1,129,280	1,129,280	1,129,280	William Kirkpatrick
1830.	1,435,446	1,435,446	1,435,446	William Kirkpatrick
1831.	1,514,037	1,514,037	1,514,037	N. H. Earll
1832.	1,652,985	1,652,985	1,652,985	N. H. Earll
1833.	1,838,648	1,838,648	1,838,648	N. H. Earll
1834.	1,943,252	1,943,252	1,943,252	N. H. Earll
1835.	1,209,867	1,209,867	1,209,867	N. H. Earll
1836.	1,912,858	1,912,858	1,912,858	Rial Wright
1837.	2,167,287	2,167,287	2,167,287	Rial Wright
1838.	2,575,033	2,575,033	2,575,033	Rial Wright
1839.	2,864,718	2,864,718	2,864,718	Rial Wright
1840.	2,621,305	2,621,305	2,621,305	Thomas Spencer
1841.	220,247	3,120,230	3,340,767	Thomas Spencer
1842.	163,021	2,128,882	2,293,908	Thomas Spencer
1843.	318,105	2,800,395	3,127,500	Rial Wright
1844.	332,418	2,968,136	4,300,554	Rial Wright
1845.	353,455	3,408,903	3,762,358	Enoch Marks
1846.	331,705	3,507,146	3,838,851	Enoch Marks
1847.	262,879	3,688,476	3,951,355	Enoch Marks
1848.	342,497	3,994,629	4,737,126	Robert Gere
1849.	377,735	4,705,824	5,083,569	Robert Gere

DATE	Solar	Fine	Aggregate bushels	Superintendent
1850....	374,732	3,894,187	4,268,919	Robert Gere
1851....	378,967	4,235,150	4,614,117	Robert Gere
1852....	633,595	4,288,938	4,922,533	Hervey Rhodes
1853....	577,947	4,826,577	5,404,524	Hervey Rhodes
1854....	734,474	5,068,873	5,803,347	Hervey Rhodes
1855....	498,124	5,584,761	6,082,885	Vivus W. Smith
1856....	709,391	5,257,419	5,996,810	Vivus W. Smith
1857....	481,280	3,830,846	4,312,126	Vivus W. Smith
1858....	1,514,554	5,518,665	7,933,391	Vivus W. Smith
1859....	1,345,022	5,549,250	6,894,271	Vivus W. Smith
1860....	1,452,565	4,130,682	5,593,247	Vivus W. Smith
1861....	1,884,097	5,315,549	7,200,391	Vivus W. Smith
1862....	1,983,022	7,070,852	9,053,874	Vivus W. Smith
1863....	1,437,656	6,504,727	7,842,383	Vivus W. Smith
1864....	1,971,122	5,407,712	7,378,884	Vivus W. Smith
1865....	1,886,760	4,499,170	6,385,930	George Geddes
1866....	1,978,883	5,180,320	7,158,503	George Geddes
1867....	2,271,892	5,323,673	7,595,565	George Geddes
1868....	2,027,490	6,639,126	8,666,616	George Geddes
1869....	1,857,942	6,804,285	8,662,237	George Geddes
1870....	2,847,691	6,260,422	8,748,115	George Geddes
1871....	2,464,404	5,910,492	8,374,956	John M. Strong
1872....	1,882,604	6,048,321	7,930,925	John M. Strong
1873....	1,661,359	5,768,998	7,460,357	John M. Strong
1874....	1,667,368	4,361,932	6,029,300	A. C. Powell
1875....	2,655,955	4,523,491	7,179,546	A. C. Powell
1876....	2,308,679	3,983,998	5,392,667	A. C. Powell
1877....	2,525,335	3,902,648	6,427,983	A. C. Powell
1878....	2,788,754	4,387,443	7,176,197	A. C. Powell
1879....	2,957,744	5,364,418	8,322,162	{ A. C. Powell, 8 months C. G. Hinkley, 4 months
1880....	2,516,485	5,482,265	7,998,750	N. Stanton Gere
1881....	3,011,461	4,905,775	7,917,236	N. Stanton Gere
1882....	3,932,447	5,307,773	8,340,180	N. Stanton Gere
1883....	2,470,533	5,432,439	7,902,972	P. J. Brummelkamp
1884....	2,353,860	4,588,409	6,942,259	P. J. Brummelkamp
1885....	2,439,332	4,494,967	6,934,299	P. J. Brummelkamp
1886....	2,772,348	3,329,409	6,101,757	P. J. Brummelkamp
1887....	3,118,974	2,576,823	5,695,797	P. J. Brummelkamp
1888....	3,115,314	2,542,053	5,657,367	P. J. Brummelkamp
1889....	2,916,923	2,448,138	5,365,061	P. J. Brummelkamp
1890....	2,726,471	2,201,651	4,928,122	P. J. Brummelkamp
1891....	2,113,727	1,735,186	3,948,914	P. J. Brummelkamp
1892....	3,122,789	1,282,885	4,405,674	P. J. Brummelkamp
1893....	2,332,052	733,854	3,065,906	P. J. Brummelkamp
1894....	2,355,394	871,859	3,227,254	P. J. Brummelkamp
1895....	2,068,289	605,835	3,214,125	P. J. Brummelkamp
1896....	2,464,422	342,178	2,806,601	Charles Hiscock
1897....	2,500,691	341,503	2,842,105	Charles Hiscock
1898....	2,044,924	428,456	2,473,381	Charles Hiscock
1899....	2,089,981 ¹ ₅ ⁴ ₆	412,590 ⁷ ₅ ⁶	2,502,571 ² ₅ ⁶	Charles Hiscock
1900....	2,422,803 ⁹ ₅ ⁶	337,947 ¹ ₅ ⁶	2,760,750 ² ₅ ⁶	Charles Hiscock
1901....	2,235,250 ³ ₅ ⁶	374,841 ⁵ ₅ ⁶	2,610,092 ² ₅ ⁶	Charles Hiscock
1902....	1,491,578 ² ₅ ⁶	186,175 ⁴ ₅ ⁶	1,677,754 ² ₅ ⁶	Charles Hiscock
1903....	1,837,423 ² ₅ ⁶	95,800 ⁵ ₅ ⁶	1,933,224 ¹ ₅ ⁶	{ Charles Hiscock, 10 months Hoyt H. Freeman, 2 months
1904....	1,608,298 ³ ₅ ⁶	135,089 ⁵ ₅ ⁶	1,743,387 ⁵ ₅ ⁶	Hoyt H. Freeman

Diocletian bought out the other owners and did business together under the name of E. and D. Alvord until May, 1813, when Elisha Alvord moved to Lansingburgh, Rensselaer County. From this time the business was carried on by Diocletian Alvord alone for many years. He died at Salina, March 10th, 1868, aged 92 years.

A very interesting account of the salt works at this time is given in Vol. I of the Transactions of the Society for the Promotion of Agriculture, Arts and Manufactures, published in 1801. The article is written by Dr. Benjamin De Witt, secretary of the Society, and is valuable as a contemporary account of the industry and as the first published account of the salt springs of any consequence. Dr. De Witt was a scientist of considerable note and his whole article shows how keen an observer he was, and is an exceedingly valuable and truthful statement of the condition of the industry at that time written by one who had given much time and study to the subject. We quote that portion of his article which describes the buildings and the method employed:

"The marsh from which the principal springs proceed is bounded, as I have before observed, by a deep bank of clayey ground, about thirty or forty feet above the level of the lake, forming the upland on which the village of Salina stands. From there is a gradual ascent for a considerable distance back, commanding a beautiful prospect of nearly the whole lake. The soil is clay, destitute of stones and for the most part timbered. Immediately below the declivity, on the borders of the marsh, and as near the springs as the ground will permit, is situated the buildings which are destined for the manufacturing of salt. They are constructed of wood, generally about twenty feet wide, and of various lengths, according to the number of furnaces they are intended to contain; in one of them are forty evaporating pots. The furnaces are placed along one side of the building, with their mouths opening into it. The other side is generally made use of to deposit the salt for the purpose of draining off the brine and allowing it to dry, immediately after it is emptied out of the evaporating vessels. The furnaces are built of stone, and two or three pots or kettles (such as are used to boil potash), containing each about eighty gallons, are usually placed over each of them. Between each two furnaces a large trough is placed, from which the water is drawn into the boilers as often as it is required. These troughs are kept continually filled with water by means of gutters into which it is pumped out of the springs. The furnaces being supplied with fuel, and the pots filled with water, they are allowed to boil briskly, and after a little while the powder scratch (as it is

called), consisting of calcareous earth, begins to precipitate to the bottom; this is taken out as fast as it is formed, by means of large iron ladles. By the time this has all fallen down the salt begins to crystallize; the pots are then suffered to boil gently, till nearly all the water is dissipated. The salt is afterwards taken out and deposited in proper places to drain off the brine and suffer it to dry. Nothing now remains in the pot but a small quantity of bittern, which is thrown away, and the same process is repeated. Part of the calcareous matter, which is precipitated in the operation of boiling, adheres firmly to the bottom of the kettle and becomes nearly as hard as stone; hence it is called stone scratch. It is necessary to separate this every few days, by means of a sharp iron pick; for if suffered to remain too long it becomes so thick as to retard the boiling. Thus simple is the whole process which is used in manufacturing a beautiful white granulated salt from the water of these valuable springs. Each boiling of a ninety-gallon pot yields about a bushel and a peck of salt; but there are many in use of a much smaller size; they may, therefore, be allowed on an average to make one bushel each by every boiling; they may be boiled down two or three times in every twenty-four hours. The whole number which have lately been employed in the different manufactories is one hundred and fifty-seven; with these, of course, about 70,000 bushels of salt may be manufactured yearly. From the report of the superintendent to the Legislature, it appears that 'the quantity of salt made, sold and delivered from the 20th day of June, 1797, to the 3rd day of February, 1798, being six months and fourteen days (in which period of time is included the sickly season of said place), being manufactured in one hundred and fifty-seven kettles of different sizes is 25,474 bushels.' From the above statement he calculates that 'the probable proceeds of all the kettles now occupied at the different salt works may be estimated at about 60,000 bushels of salt per year.*

By reason of the immediate mixing of the waters of the salt springs with the waters of the marsh, it was impossible to make any computation of the quantity which they yield, or the amount of salt that may be made from them; but it must be very great, for one of the springs alone, judging from the stream which it emits, it is supposed could scarcely be lowered by the operation of an ordinary pump. Of many of the springs

* Sixty thousand bushels of salt made annually, at the rate of four cents per bushel (the duty imposed by law), will afford a revenue to the State of \$24,000; this will increase in time, with the increase of the manufactories, to a very handsome sum. The price of salt is regulated not to exceed 50 cents for a bushel.

now used by the manufacturers, but a small part of the water is consumed; besides a great many others that remain unoccupied; and it may be presumed that many more will be discovered from time to time. This abundant quantity of the water will permit a very great increase of the manufactures and a production of salt to an immense amount."

From 1800 on, the salt works grew very rapidly and many embarked in the new industry. In 1805 Asa Danforth, Jr., son of one of the first manufacturers, instituted an innovation in pumping the brine from the wells by using horse-power for this purpose. This method was not used very long, however, and during the term of Superintendent John Richardson, in 1809, he conducted the water of Yellow Brook in a race from Syracuse to Salina, which ran a water wheel that drove the pump used for elevating the brine. It is almost certain that this was the first instance of machinery other than hand or horse-power being used for the elevation of the brine.

In 1801 the act which made it necessary for the superintendent to keep a quantity of salt in store was repealed; and the one-cent storage charge was omitted.

We append herewith a list of the salt manufacturers during the year 1803, together with the amount of salt made and other details. It is inserted through the courtesy of Mr. Thomas K. Gale of Syracuse, who possesses the original list.

In 1810 Dr. William Kirkpatrick began a term of twenty years as superintendent and during this period many improvements were made and the industry grew to large proportions, the increase being from 200,000 bushels made in 1811 to 1,435,446 bushels made in 1830. This phenomenal increase was primarily due, of course, to the great increase in population and the settlement of the country, not only in the neighborhood of Onondaga County but also throughout the whole State and adjoining States; for at this time almost all of the salt used in this part of the country was supplied by the Onondaga works. No small amount of credit for the growth must be given to Dr. Kirkpatrick, who by his efficiency and unwavering fidelity to his position greatly aided the growth of the industry during those years.

During the year 1812 some changes were made in the laws governing the reservation and the office of superintendent. Chief among these was the reduction of the duty from 4 to 3 cents per bushel. The superintendent was also required to give bonds for the faithful performance of his duty and to issue a report on January 1st of each year stating the amount of salt made and inspected during that year and containing a description of the present state of the works and

A GENERAL STATEMENT OF THE NUMBER OF KETTLES SET IN THE FURNACES FOR BOILING SALT, AND THEIR CAPACITIES IN GALLONS; AND THE NUMBER OF BUSHELS OF SALT MANUFACTURED ON EACH LOT FROM THE FIRST DAY OF JANUARY, 1803, TO THE FIRST DAY OF JANUARY, 1804, AND THE AMOUNT OF RENT AT TWO CENTS PER MONTH PER GALLON CAPACITY OF KETTLES ON EACH LOT.

LESSEES' NAME	Number of Salt Lots	Number of Kettles on each Lot	Capacity of Kettles on each Lot in gallons	From	To	Bushl. Lbs.	Dolls. Cts.
						Amount of Salt Manufactured on each Lot	Amount of Rent due on each Lot at two cents per month per gallon
Samuel Cook.....	I	6	488	Jan. 1st, 1803	July 1st	1426 7	58.55
Samuel Cook.....	I	8	608	July 1st	Jan. 1st, 1804	2783 34	72.96
Isaac Lane.....	I	6	420	April 1st	July 1st	506 33	25.30
Samuel Comstock.....	I	12	750	July 1st	October 1st	711 55	45.00
William Culver.....	I	12	800	November 15th	January 1st	541 40	24.00
Philip Kiley.....	2	6	422	January 4th	ditto	2851 30	101.28
Tubs & Brown.....	2	6	404			2232 5	96.96
Isaac Lane.....	2	6	425	January 1st	July 1st	1489 20	51.00
Stephen Avery.....	2	6	434	ditto	January 1st	2367 15	104.16
E. & D. Alvord.....	2	18	1270	ditto	July 1st	7155 26	152.40
E. & D. Alvord.....	3	12	858	July 1st	October 1st	1629 14	51.48
E. & D. Alvord.....	3	6	412	ditto	August 1st	399	8.24
E. & D. Alvord.....	3	18	1270	October 1st	January 1st	2131 49	76.20
Jonathan Dexter.....	6	500		January 1st	December 1st	2493 46	110.00
Jonathan Dexter.....	6	340		December 1st	January 1st		6.80
John Rapelje.....	4	6	397	January 1st	ditto	1524 51	95.28
John Harris.....	5	6	340	April 1st	ditto		61.20
William Gilchres.....	6	6	422	January 1st	ditto	1841 4	101.28
William Mitchell.....	7	6	480	ditto	April 1st	268 23	28.80
John Copp.....	7	6	400	April 1st	October 1st	869 5	48.00
William Mitchell.....	7	4	340	October 1st	January 1st	92 38	20.40
Barnett Ruff.....	8	6	460	January 1st	ditto	3305 48	110.40
John O'Blenis.....	9	6	430			4221 19	103.20
John Rapelje.....	10	6	540			3238 36	129.60
Martin Wandle.....	II	12	805	January 1st	April 1st	1366 17	48.30
Martin Wandle.....	II	6	417	April 1st	January 1st	1385 5	75.06
Wilber & Russell.....	12	1065		January 3rd	October 1st	3708 42	180.67
John Love.....	12	6	432	January 1st	April 1st	840	25.92
John Love.....	12	6	430	April 1st	October 1st	373 32	40.80
Benajah Byington.....	12	6	432	October 1st	January 1st	767 23	25.92
Jesse Sumington.....	13	6	875	January 1st	April 1st	1559 17	52.50
Jesse Sumington.....	13	14	1030	April 1st	January 1st	5125 17	185.40
A. Goyer & P. Smith.....	14	6	927	January 1st	July 1st	4176 37	111.24
A. Goyer & P. Smith.....	14	6	445	July 1st	October 1st	789 6	26.70
A. Goyer & P. Smith.....	14	6	337	August 1st	ditto	482 28	15.08
A. Goyer & P. Smith.....	14	12	822	October 1st	January 1st	1293	49.32
L. Fuller & J. Rapalje.....	15	12	940	January 1st	April 1st	1322 35	56.40
L. Fuller & J. Rapalje.....	15	6	407	April 1st	January 1st	1604 18	73.26
L. Fuller & J. Rapalje.....	15	6	493	ditto	September 1st	478 41	49.30
William Bulkley.....	15	6	407	January 20th	April 1st	64 14	3.55
William Bulkley.....	15	6	355	April 1st	April 15th	3442 24	127.54
William Bulkley.....	15	12	762	April 15th	January 1st	1483 40	56.64
D. Howlet & Porter.....	16	6	472	January 1st	July 1st	721 31	24.00
D. Howlet & Porter.....	16	6	400	January 1st	April 1st	1160 30	45.15
D. Howlet & Porter.....	16	6	430	April 1st	September 8th	57 53	15.30
D. Howlet & Porter.....	16	6	340	September 8th	November 15th	322 24	14.16
D. Howlet & Porter.....	16	6	472	November 15th	January 1st	619 35	40.80
Thadeus M. Wood.....	17	6	340	January 1st	July 1st	182 21	81.60
Jobiel Hopping.....	20	6	340	ditto	January 1st	816 45	61.20
Clement Miner.....	25	4	340	ditto	October 1st	1465	81.60
James Armstrong.....	26	4	340			1540	81.60
Thomas Pool.....	27	4	340			605 6	59.64
Patrick Riley.....	28	6	497	January 1st	July 1st	831 42	40.80
Patrick Riley.....	28	6	340	July 1st	January 1st	2045 44	81.60
Andrew Pharis.....	30	6	340	January 1st	January 1st	2412 28	113.40
A. Hawley & P. M'Cabe.....	31	10	630	ditto	October 1st	533 28	31.60
A. Hawley & P. M'Cabe.....	31	10	510	October 1st	January 1st		
						90335 4	3686.55

an account of all improvements made. It is from these reports that we gain most of the facts for a history of the works from 1812 down to recent years.

An acreage was also set apart for the experiment of making salt by solar evaporation instead of boiling. Anyone who should endeavor to make salt by this method upon these lands was to be relieved from paying any duty or rent.

These facts are important as the first mention of solar salt, which was finally manufactured in a practical way against much opposition in 1821 and, growing to large proportions, finally displaced boiling when the great salt beds of Central New York were discovered and exploited in the early "eighties."

The salary of the superintendent was continued at \$800 a year, a small sum as compared with present-day standards, and a sum of \$850 was also appropriated for the salaries of three deputies who should have immediate supervision over Salina, Geddes and Liverpool, respectively. An appropriation was also made for the maintenance of the office and for all expenses necessary to a complete performance of the duties of superintendent.

In 1816 a duty of $12\frac{1}{2}$ cents per bushel was imposed for the purpose of increasing the Erie Canal building fund. In addition to the yearly report, the superintendent was required to make quarterly reports to the Commissioners of the Canal Fund and pay into the State treasury all monies collected, less salaries and expenses, on the first Tuesdays of February, May, August and November of each year.

Although this tax was a great burden on the salt men, still they put up with it cheerfully, knowing that the completion of the Erie Canal would give them a means to transport their goods cheaply to markets which heretofore they had been unable to reach. Their opinion in this matter was fully substantiated and the Erie Canal proved to be a great blessing to the Onondaga salt works and to many other industries in the central part of the State. Salt has been brought via the canal to the Atlantic seabord from that day to this and during spring, summer and fall months it is a familiar sight to see the plodding mules towing the slow-moving boats laden with salt along the narrow waterway to the Hudson at Troy, where they are picked up by tow-boats and transported along our historic stream to New York.

The tax was in force until 1834, when it was replaced by one of 6 cents per bushel. The superintendent's salary was also increased to \$1,250 per year in 1816.

The year 1820 was marked by the surveying and sale of certain portions of the reservation, which were laid out in

building lots for residence and business purposes. Streets, squares and plots for additional salt blocks were also laid out. The increasing population demanded this extension and the sale of the lots was of benefit in another direction; as the proceeds of the sales went to the Commissioners of the Canal Fund and were used by them to help defray the expense of building the canal, except the first \$20,000 realized, which was used for the improvement of navigation on the Oswego River, an equally laudable purpose.

At about this time additional caution was taken with the manufacture and inspection of the salt and its quality greatly improved. Many impurities contingent upon careless and neglectful manufacture were done away with by the enactment and strict enforcement of the following laws: "The use of lime or ashes was prohibited in the manufacture of salt, under a penalty of fifty dollars for each and every offense, and manufacturers were required to keep in use two good bitterns pans for every three kettles employed in the manufacture of salt, under penalty of twenty-five cents for every case of neglect."*

The year 1820 is also marked by an act of the Legislature authorizing Major Benajah Byington to bore for rock salt at any point in the reservation. Major Byington had been engaged in the manufacture of salt at Salina for a number of years and had long held the idea that there existed a strata of rock salt underlying the springs which could be reached by boring. If successful he was to receive a royalty of two cents per bushel on all salt mined for a term of ten years, the State reserving the right to take over at any time any mines or buildings erected by any owner after first reimbursing him three times over for his outlay. His operations were mainly confined to the high ground east of Syracuse, and for many years, at considerable expense, he persisted in his endeavors to find the object of his search, but without success. Increasing age and the lack of funds finally put an end to his labors. He finally died February 8th, 1854.

In 1821 lands were set apart and laid out for the manufacture of solar or coarse salt, by the evaporation of the sun upon the brine in open vats. Soon after the setting apart of the lands, the Onondaga and Syracuse Salt Companies were formed for the purpose of manufacturing solar salt, and the origin of making this kind of salt, which later grew to such large proportions, may be stated to have begun from this date. The erection of the solar vats at first provoked much opposition from the fine salt boilers and it was necessary for the

*Clark's History of Onondaga Co., —

Legislature to pass stringent laws for their protection. In 1822 further laws were passed for the encouragement of solar manufacture, a bounty of three cents per bushel being offered for all salt of this kind which should be shipped to the Hudson River, Lake Erie or Lower Canada. Thus was the extension of commerce fostered in those early days. This bounty was in force for five years and was to be paid to the first two manufacturers who should each make 100,000 bushels of solar salt within five years. The manufacturers were also allowed the privilege of taking the brine from the springs ahead of others, and their employees were exempt from service on juries and ordinary military duties. Destruction of solar properties by any means was constituted a felony and offenders severely punished.

During 1821-1822 the Coarse Salt Company erected a large pump driven by waste water from the canal, with which they supplied themselves with brine. Up to this time most of the brine had been pumped by hand. The power pump proved very successful, however, and brine was pumped to other manufacturers by arrangement. In 1826 the State bought these pump works and enlarged them to such an extent that brine could be supplied to all the manufacturers.

During the year 1826 an engineer was appointed for the salt works at Salina. Simeon Ford was the first incumbent and his duties were the supervision of pumps, aqueducts, reservoirs, wells, conduits and machinery and the distribution of the brine. His salary was fixed at \$1,000 per year. This office was created in order that the State might superintend the pumping and distributing of the brine. Proceeding along these lines, the first act of the new engineer was to take possession, in behalf of the State, of the well, reservoir and twenty-five miles of wooden pipes for distributing the brine, all of which belonged to the Onondaga and Syracuse Salt Companies. The State paid the owners \$8,700 for the property, which amount was decided upon by a committee composed of Azariah Smith and Sylvanus Tousley, of Manlius, and Robert Richardson, of Vernon, after they had made an inspection of the property.

It may be interesting to note here that Ford was also an exponent of the mistaken idea held by Major Benajah Byington that beds of rock salt existed in the neighborhood of Salina.

Under the supervision of Ford a new well was sunk at this time, the dimensions being thirty feet deep and twelve feet in diameter. The manner of sinking the well seems curious in comparison with present-day methods of excavation. Staves thirty-two feet long were fitted together by means

of grooves and tongues in the form of a cylinder, and further reinforced by bands of iron around the circumference of the cylinder. The whole affair was then driven down to the desired depth by means of pile drivers and the earth excavated from the inside. The cost to the State of this construction, together with other operations, was \$30,000.

Mr. Henry Burden, superintendent of the Troy Nail Factory, also visited the works in order to design new pumps and other necessary constructions. A quite considerable amount was spent for the construction of machinery at the Cold Spring foundry at West Point, which foundry was very well thought of in those days. Large reservoirs were also erected for the use of the solar salt manufacturers.

During the year 1825 there were 768,188 bushels of salt produced, which amount was less than the quantity produced in the preceding year. A good idea of the size of the industry at this time may be gathered from the superintendent's report issued in 1826, which says: "There are now on the reservation 150 manufactories of fine salt, containing 2,275 kettles, viz.: at Salina, 97 blocks of 1,412 kettles; at Geddes, 20 blocks of 274 kettles; at Liverpool, 23 blocks containing 311 kettles, and at Syracuse, 17 blocks containing 278 kettles; and there are three manufactories of coarse salt by artificial heat at Salina. The Syracuse Company have erected 36,416 feet in length of vats, for solar evaporation; the Onondaga Salt Company, 35,800 feet, and Henry Gifford, 2,784; making in all 74,700 feet in length by 18 feet in width, exposing a surface of 1,354,640 superficial feet. When in a proper state for evaporation, the vats contain at least 3,000,000 gallons of brine. There have been inspected on the reservation 816,000 bushels. The whole works now erected are competent to manufacture 2,000,000 bushels."

During this year several new pumps were set up in order to force the brine from the wells to the works in a more satisfactory manner than had been done in the past.

For some time the Coarse Salt Company possessed the best and largest pump works on the reservation, and in 1826 the State purchased these and enlarged them sufficiently to supply all the manufacturers with brine. Previous to this purchase all pumping had been in private hands.

In 1827 several additional wells were sunk at Geddes and Salina which supplied very good brine. During 1828; 1,103,172 bushels of salt were made and inspected.

From this point on, the works were constantly being improved and enlarged, more and deeper wells were sunk, improved pumping apparatus was installed and numerous boiling blocks and solar evaporating vats were constructed.

With the exception of a few insignificant attempts in other localities, the Syracuse field had a monopoly on the manufacture of domestic salt until 1866, when the Michigan deposits were discovered, and it is not to be wondered at that they increased to such large proportions. During their prime, from 1825 to 1875, the industry was known from coast to coast and was the cause of the phenomenal growth of the city of Syracuse during that period. After 1875, with the discovery of salt in other States and other parts of New York State, the works declined and later only solar salt was made. The new fields had the advantage of stronger brine and cheaper fuel, and at the beginning of the twentieth century the industry was but a ghost of its former condition; miles of abandoned solar vats and here and there a stark and lonely chimney gave evidence of past glories. As a frontispiece the reader will find a faithful reproduction of a water color by W. Goodrich Beal depicting the appearance of the last of the boiling blocks. The original is a treasured possession of the author, being given to him by Mrs. George W. Kavanaugh, formerly Mrs. W. H. Haberle, a prominent resident of Syracuse. A more extended account of the industry's decline will be given later.

During 1830 iron tubes were first used to line the wells. Cylinders twelve inches in diameter and three and a half feet long were clamped together, making a strong and satisfactory lining. Coincident with the new construction, stronger brine was found, making the undertaking a great success.

During 1831; 189,000 bushels of coarse salt were manufactured and there existed 1,333,024 feet of solar vats and 3,076 boiling kettles. Seven pumps raised the brine, four actuated by water power and three by steam. During this year an additional well was bored by Mr. Stephen Smith and others to a depth of 160 feet, which was taken over by the superintendent of the reservation.

In 1835, so great was the demand for brine at Salina that most of the manufacturers were compelled to suspend operations for several weeks, as the pump at that place could not keep up with the demand.

The winter of 1836 was an uncommonly severe one and the heavy fall of snow seriously damaged the vat roofs; so much so that most of the summer passed in mending, hence the output for this year fell off considerably. The deep snow also prevented the piling up of wood fuel and spring freshets flooded Onondaga Lake to such an extent that works on the banks were injured. During the year a new well was sunk at Liverpool and new pumps erected which could raise 400 gallons per minute. Duties at this time were 6 cents per bushel and were in force until 1847, when they were reduced

to a cent a bushel. In 1837 the works, under favorable circumstances, were capable of producing 4,000,000 bushels annually.

During 1838-39, \$4,000 was expended in an effort to find rock salt. A well was sunk to a depth of 600 feet without finding salt, and the attempt was given up. Since this operation many other attempts to find the salt rock have been made, but without success, and it is now believed by the geologists that the strata underlying Syracuse does not approach near enough to the surface to be reached by boring.

In 1840 a new pump house was erected at Liverpool and a new well sunk at Syracuse with a depth of 220 feet.

The year 1841 is marked by the substitution of wooden tubing for wells in place of iron or copper. Although metal would seem to be more modern than wood, yet this material was found to be the cheapest and also the best, inasmuch as metal was subject to corrosion by the brine. The metal linings were also found to be very heavy, and often sunk below the desired depth. During this year reservoirs for brine were erected at an expense of \$15,000. A new pump house was also built at Salina. The edifice was a fine stone building, completed at a cost of \$30,000.

In 1848, one hundred and seventy works were in operation, employing 2,414 men and 1,000 horses. About 1,000 cords of wood were used daily for fuel when the entire number of works were in full operation. During this year a beginning was made in using hard coal for fuel instead of wood. Coal at that time could be delivered at the works for \$5.00 per ton. The cost of wood was \$3.50 per cord, and inasmuch as it was found out by test that a ton of coal would be the equal as fuel of two cords of wood, a saving of \$2.00 on every ton of coal used was apparent. These experiments encouraged Mr. Thomas Spencer (superintendent, 1841-43) to build a large boiling block designed to use coal as fuel. The dimensions of the building were 256 x 44 feet and it contained 80 kettles, each with a capacity of 120 gallons.

It may perhaps be of interest to give here an account of the different modes of manufacturing salt at about the period of 1849-50. In a little over twelve years the yield had jumped from about 1,000,000 bushels yearly to 5,000,000, and the methods pursued at this time are typical of the industry at its height.

There were three methods: Rapid boiling in kettles, slow evaporation by the sun's heat in open vats, and evaporation by artificial heat, which was abandoned at about this time. By far the largest quantity was made by boiling, and we may describe this method by saying that from twenty to eighty iron kettles of about 100 gallons each were set in

brick arches with fireplaces beneath them, the whole arranged in two parallel rows which constituted what is known as a "block," an appellation which lived after the demise of boiling blocks and now serves to designate any kind of an evaporating plant. Above the kettles ran an enclosed trough, carrying brine from the reservoir to the kettles by means of individual conduits from trough to kettles. These were filled with brine, the supply shut off and boiling commenced. At the bottom on the inside of the kettles were detachable false-bottoms called bittern ladles. As soon as boiling commenced, before the salt began to crystallize, the impurities of the brine would fall to the bottom and be removed by the ladles, after which the further process of boiling would be continued and the salt crystallize in the bottom of the kettle until almost all the brine is evaporated and a goodly quantity of salt left in the kettle. The salt is now scooped out into baskets which are held over the kettles until all the adhering brine drains off and the salt becomes dry. It is then removed to bins and cooled, when it is ready to be packed in barrels or bags, as the case may be.

The method of solar evaporation is as follows: Two sets of wooden vats are constructed. Each vat is about eighteen feet wide and one foot deep; their length being governed by the available space. The vats are supported by piles at a height of about four feet from the ground.

The brine is conducted through wooden pipes from the wells to the first series of vats, where it is allowed to stand until all impurities are precipitated. From thence the brine is led to the second series or tier, where the sun's rays gradually evaporate the water, leaving a clear white residue of salt on the bottom of the vats. Of course the process is greatly aided by a run of good weather, and the principal season for making salt in this manner is from May to September. During periods of rain the vats are covered with detachable watertight roofs which prevent the brine being adulterated and weakened by rain water. During rains it is obvious that all evaporation ceases and the season's crop of salt is governed more or less by the weather.

This solar method of salt-making is the only process now employed at Syracuse. When the great strata of rock salt throughout Central New York State was discovered and developed during the "eighties," the demand for boiled Syracuse salt gradually disappeared, as the makers could not compete with the new and stronger brines or the vacuum pan and grainer systems of scientific evaporation, and the boiling blocks were gradually abandoned, leaving only the solar works. It must not be inferred, however, that this change took place

abruptly; on the contrary, it took considerable time to effect the transition. Additional particulars and dates will be given further along in our narrative.

The third and last method of manufacturing salt at this date, 1849-1850, was known as evaporation by artificial heat and was practised as follows: Iron vats of large size received the brine, which was subjected therein to a temperate heat applied directly to the vats or else by the agency of steam pipes. Owing to the great expense attached to this method of manufacture, it was discontinued shortly after its inception.

At this period a large part of the table salt consumed throughout the country was imported from England, but nevertheless a certain percentage of the entire output at Syracuse was dried and ground into table salt. Four establishments did this work, the Hope Factory, at Syracuse, and William A. Porter, Warner H. Porter and J. P. Haskin, at Salina.

We will close our description of the industry at this date by enumerating particulars of the wells and supply pipes from wells to works. One million six hundred thousand gallons of brine per day were consumed by the various blocks, flowing through twenty-five miles of wooden pipes. Seven wells had been sunk, averaging in depth from 180 to 320 feet. Seven pumps drew up the brine, six of them actuated by water power and one, at Liverpool, by steam, able to throw up 45,000 gallons per hour.

Upon glancing at the table on page —, we find that the total amount of salt manufactured took an upward trend beginning at 1849, which it maintained for many years. The ever growing increase in population of the entire country occasioned by tremendous immigration, and the settlement of the great West by throngs of pioneers for the most part engaged in stock-raising and farming had its effect on the salt industry at Syracuse. The settlers, from the nature of their occupations, used the coarser grades of salt made almost exclusively here, and consequently the tonnage rose by leaps and bounds for the next thirty years. Better facilities for transportation also made themselves apparent by the construction of canals throughout the West, tapping the new markets and in themselves a great inducement to further settlements. Among these may be mentioned the Michigan and Illinois Canal, giving an entrance into St. Louis, from which point the product could be carried to far western beef-packing points through the Mississippi and Missouri rivers. Thus through the opening of the great West the industry received a reward for the endeavors of the early salt-makers in starting and encouraging this same sort of settlement in their own County of Onondaga forty years back.

To keep apace with the new demands the makers spared no effort in keeping their product up to a high standard of quality. They obtained the services of the most eminent scientists for this purpose and the records of the industry show most careful attention to this question. Missionary work was resorted to for the purpose of overcoming prejudice in favor of foreign salt and reports secured from our naval officers throughout the world showed that Onondaga salt excelled for packing meats and stood up well against unfavorable conditions and climates. Tests were also made by Prof. Emmons, State Geologist, and Prof. Beck, State Mineralogist, which proved the domestic article to be better than the foreign.

During the year 1850 several solar blocks adjacent to the fast growing city of Syracuse were abandoned and the buildings leveled in order to provide room for civic development. The owners were reimbursed for their loss and given lots at other points on which to continue their occupations.

On April 10th, 1850, an act of the State Legislature was passed which had an excellent and lasting effect upon the industry. It was entitled "An Act to improve the quality of the salt manufactured in the County of Onondaga, and to protect the purchasers of the same." Previous to the enactment of this ordinance a great many well founded complaints had been made regarding the poor quality of the salt produced. It was alleged to be damp and wet and very liable to cake. Also chemical analyses showed that a higher percentage of sodium chloride could be obtained by scientific methods of manufacture. The framers of the act correctly surmised that improved treatment of the brine was the first step to be taken and laid particular emphasis upon this point. With this idea in mind, Robert Gere, the superintendent, engaged the services of Professor George H. Cook, an eminent scientist and chemist, to devise some means of purifying the brines.

Professor Cook's investigations extended over a period of several years and were extremely important. His investigations proved that lime used in clearing impurities from the brine caused the salt made from it to take on moisture absorbing characteristics and as a little lime slipped into the made salt it was just that much impure. Besides pointing out where the trouble lay, Professor Cook advocated the use of alum as a substitute, which proved entirely satisfactory, and therefore removed one of the chief prejudices against the use of Onondaga salt, which was the over-large quantity of lime it contained. We subjoin herewith a report from the pioneers in the use of alum. After a few years the employment of it became general:

Syracuse, Dec. 19, 1850.

Robt Gere, Esq., Supt. Onondaga Salt Springs:

Sir—At the suggestion of Prof. George H. Cook, who has been employed by you during the past season for the purpose of devising some method of improving the quality of Onondaga salt, we have tried the experiment of using alum to precipitate the oxide of iron contained in the brine from which our salt is manufactured, and have found it most effectual for that purpose, and the expense trifling, as it requires but two pounds of alum to about five thousand gallons of the brine.

For many years past, the manufacturers have generally used quick lime for that purpose, supposing it to be preferable to any other substance, but from our experience during the past season, we are fully convinced that alum is altogether the best article, and that it should be substituted in place of lime for settling water, and that the use of lime should be prohibited, as alum is not only equally efficient in settling the iron, but it improves the grain of the salt, making it of firmer and harder texture, and it also drains more readily.

Respectfully yours, etc.,

THOS. SPENCER,
GEORGE STEVENS,
R. W. NOLTON & CO.,
H. ACKERMAN,
J. HARTSHORN,
J. P. HASKIN,
W. A. PORTER,
L. GLEASON.

The anxiety of the makers to get rid of oxide of iron can be appreciated when it is understood that salt exhibits a yellowish tint when it is present.

Experiments in manufacturing made by S. B. Howd of Syracuse also created considerable interest. This enterprising personage conceived the idea that precipitation of impurities would be more thoroughly induced by heating the brine in closed vessels to a temperature of 280 degrees, then forcing it into another vessel or boiler where saturation took place, and finally evaporation in open pans or vats aided by steam—surely an interesting process and somewhat akin to later developments along the line of vacuum pans.

Of interest also at this time was the completion of the superintendent's and inspector's office building, at an outlay of \$6,500, quite imposing for those days. In June, 1851, a

new pump house was erected at Salina, which was badly needed.

During the years 1852 and '54 great strides were made in the manufacture of salt at Syracuse. Many new boiling blocks and solar plants were erected, greater attention was paid to the quality of the product, and in consequence Onondaga salt was in general favor throughout the country. We may justly call this period the "era of progress and achievement," and no small amount of the credit was due to Professor Cook. He blazed the trail, and such a good one that it soon became the broad highway through which the makers achieved the goal of success.

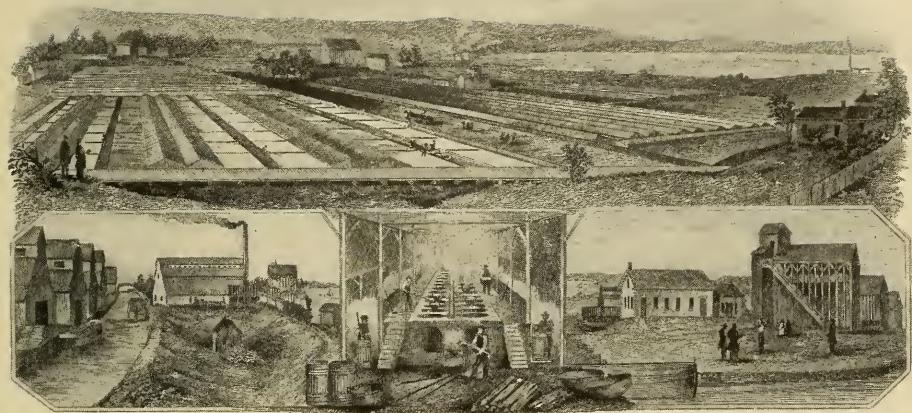
Among his activities was an exhaustive survey and examination of the English salt works. Economy of fuel was one of the lessons learned from the English which he imparted to the Americans, and in many other ways his visit to these fields was of great benefit to the American manufacturers. Not content with the use of alum as a substitute for lime in settling brine, he experimented in the use of clay for this purpose and found that this material was also a good substitute for lime. 5,404,524 bushels were made during 1853, which was the record up to this time.

An evidence of the quick growth of the industry in 1853 was the erection of thirty-nine additional boiling blocks and also many solar plants.

The State kept pace with the energy and enterprise of the makers by sinking two new wells to supply the additional brine needed. One was just north of the Syracuse pump house and the other was at Salina.

An exhaustive test of Onondaga salt for meat packing purposes was made by the Navy Department, and their report, being most encouraging, did much to remove the last vestiges of prejudice against its use for the above purpose.

The next subject that Professor Cook turned his attention to was the inefficiency of the solar salt works. After much watching and investigation he discovered that, owing to poor construction, there was considerable leakage at the vats, so much so that 130 bushels of salt should have been made from an amount of brine that only produced 50 bushels. Part of this astonishing loss was due to poor carpentry in the making of joints and in the general construction of the vats, which was corrected under his supervision. The balance of the loss was due to the remarkable fact that chloride of calcium, a component part of brine, would pass directly through wood or common stoneware by absorption and carry with it a considerable amount of sodium chloride. This, of



SALT WORKS AT SYRACUSE, ONONDAGA COUNTY, N. Y.

From an old print circa 1850

course, was disconcerting, but the use of non-conducting material for lining the vats solved the difficulty.

Prosperity reigned with the salt-makers until 1857, when a general business panic throughout the country made itself felt at Syracuse. The yearly production, which had been in the neighborhood of 6,000,000 bushels for the three years preceding, shrunk to a little over 4,000,000 bushels. The quality of the product, however, still maintained a high standard and by this time the use of alum as a brine settler had become quite general, displacing the injurious lime.

In regard to fuel, coal was beginning to be used in place of wood, as it was found out that more work could be done per ton with it and a saving of 10 cents per barrel on costs effected by its use.

The panic, with its attendant bank suspensions, seriously discouraged the building of any considerable number of new boiling blocks or solar vats; only three blocks and 3,000 vats were built during the year. Besides the shortage occasioned by panic, a steady continuance of rainy weather during the summer interfered with even a normal production of solar salt. A new well was sunk during 1857, making six altogether in the Syracuse district. A new pump house was also constructed at Syracuse at a cost of \$30,000. It was three stories in height, and built of Onondaga limestone.

Some attention was paid at this time to the subject of better care of the salt after it was packed and ready for shipment. Very often barrels were left outside and exposed to the elements of the weather, which resulted in deterioration in quality and also allowed the rain to dissolve a certain quantity of the contents. Other careless habits in handling the product were also indulged in. Through the efforts of Vivus W. Smith, superintendent, these practices were discouraged and manufacturers took particular pains to care for their product after, as well as during production.

After 1857 the production assumed again its normal proportions, and 1858 was a record year with 7,033,391 bushels; 1859 also contributed no mean amount, with 6,894,271 bushels.

During 1860 the Western States experienced a business depression, of not enough consequence to be termed a panic, but sufficient to reduce the amount to 5,593,247 bushels and to render this quantity difficult to sell.

The importers of foreign salt also kept up a vigorous competition with the Onondaga product, and this fact with the competition supplied by the salt manufacturers of Ohio and Virginia, tended to restrict the amount of Onondaga salt sold at the time. This extreme competition was only

spasmodic in character, however, and soon receded to its normal proportions.

A far more important source of competition, however, began soon to loom upon the horizon in the shape of salt works in Michigan. That salt deposits existed in this State was known from the time of the first settlements, but they were not put to any use until the early "sixties," when production of salt was started, aided by a bounty of 10 cents a bushel from the State. With this impetus the industry grew rapidly until it assumed large proportions and finally became a contributing cause to the decline of the Onondaga field, which began about 1887.

After the poor year of 1860 the industry again caught up and the period from 1861 to 1884 was the high tide of the industry; the enormous amount of 9,053,874 bushels being made in 1862, which is the record from the beginning of the industry up to the present. During this period only three times did the yield fall below 7,000,000 bushels, which years were 1865, 1874 and 1877.

By 1860 one-third of the entire number of boiling blocks used coal as fuel and it was delivered at the remarkably low price of \$3.00 per ton, and as time passed, its use became more general.

During 1860 and subsequently, a superior quality of fine salt for table use was manufactured by especial care and improved processes in the boiling blocks. The salt then was dried by artificial heat and ground to a fine grain. The superintendent's report states that it was "subsequently medicated by a patented application recently discovered, which finishes the process." We are at a loss to imagine what this highly mysterious application could be unless it was the simple addition of corn starch or carbonate of magnesia, to promote free-running qualities. At any rate the salt was known as "factory filled" and enjoyed a large sale wherever a high grade article was in demand. The name "factory filled" is in use even today to denote a good quality of salt.

By 1888 the strong competition of the other salt producing localities in the State and in Michigan was keenly felt at Syracuse, and owing to their inability to compete with the stronger brine and vastly improved processes used elsewhere, the Syracuse manufacturers were forced to curtail their production to an alarming extent. By 1890 the production had fallen from an average of about 8,000,000 bushels during the "seventies" and "eighties" to 4,928,122 bushels.

It was now clearly seen that the days of big production had gone never to return and that the Syracuse salt works

would henceforth take an inferior place among the salt producing localities of the State.

By 1898 the production had fallen to 2,473,381 bushels, and in 1906 the amount was 1,803,086 bushels.

In 1897 the State Legislature passed a law declaring all leases of salt lands void after March 1, 1898, but meanwhile giving the lessees an opportunity to purchase the lands of which they held leases. The time limit was afterwards extended another year and most of the lessees took advantage of the opportunity to purchase their lands. This same law also provided that the State should *cease to furnish brine at any expense to the State*, but as the revenue derived was sufficient to pay operating expenses, the State continued to furnish brine until 1908, when the pumping outfit was sold to the Onondaga Pipe Line Company and the Mutual Pipe Line Company, both of Syracuse. The property was conveyed for the nominal sum of \$15,000. Thus ended the long-established interest of New York State in the Syracuse salt works.

Since then, the manufacturers and pumpers have continued without any State aid. The amount of salt now made at Syracuse (1917) is very small and the quantity is constantly decreasing. During recent years the output has been marketed by the Onondaga Coarse Salt Association, a selling organization owned by the producers.

Chapter III.

THE OLD SALT WORKS OF CAYUGA COUNTY

THE salt works of Cayuga County during the early years of the nineteenth century were of considerable importance and vied with the workings at Syracuse during that period. These workings were at Montezuma, at the junction of the Cayuga and Seneca Canal with the Erie Canal.

The salt springs at Montezuma were discovered by the Indians at a very early period previous to the coming of the white men into this section of the State. When the first white settlers did arrive about 1798 the springs were shown to them by the Indians. Among the first to arrive were Peter Clark, Comfort Tyler and Abram Morgan who settled at this place for the purpose of manufacturing salt, having heard of the springs from the Indians. Of these, Comfort Tyler had already been engaged in the boiling of salt at what is now Syracuse and an account of his activities there may be obtained by referring to the chapter on Onondaga County.

These early attempts at salt making by the Indians were merely holes dug in the ground, a foot or two in depth, in the marsh at the foot of the ridge upon which the village of Montezuma is situated. Later on the settlers increased the depth of the wells to forty or fifty feet. During the year 1807 salt brine was discovered in a small branch of the Seneca River, afterwards called Salt Creek, at a depth of about eight to ten feet from the surface.

In 1810 the systematic manufacture of salt was undertaken by a company formed for that purpose which was called the Cayuga Manufacturing Company.

In 1811 Col. Comfort Tyler, whom we have mentioned before, arrived at Montezuma with his family and immediately took an active interest in the company. He at once saw the necessity of connecting Montezuma with the surrounding country by good turnpikes so that the salt might easily and profitably be carried to these points, and offered for sale in competition with the Syracuse product. The company therefore, on his advice and under his personal supervision, built two long bridges over the Seneca and Clyde Rivers, and built a turnpike three miles in length, over the Cayuga marshes. Although this marsh was so soft that a pole might easily be thrust ten or twelve feet into the mire, the road was successful and was finished at a reasonable cost, due to the exertions of Col. Tyler.

A well was sunk to a dept of 100 feet on the west side of the ridge upon which the village of Montezuma now stands and on the site of the old wells used by the Indians, at which point was found a copious supply of brine which came in through a body of quicksand. According to a letter written by Comfort Tyler this brine produced twenty ounces of salt to the gallon. A chemical analysis was made of the brine by a Mr. G. Chilton of New York City, who was probably a chemist of that time, and the following result was obtained in 1000 grains of brine:

Chloride of Calcium.....	1.53
Chloride of Magnesium.....	0.30
Sulphate of Lime	4.31
Carbonate of Lime.....	0.02
Chloride of Sodium	73.72
Water, etc.	920.12

An interesting insight into the state of the Montezuma Salt Works at this time may be obtained from the private journal of DeWitt Clinton who made a journey through central and western New York during the summer of 1810. Clinton, besides his fame as the father of the Erie Canal, also served two terms as governor of the State, from 1817 to 1823 and from 1825 to 1828. The extract from the journal relating to the Montezuma works is as follows: the Mr. Andrews mentioned probably being the manager of the Cayuga Manufacturing Co.

"July 22nd—Montezuma is in No. 80 Brutus in the town of Mentz, and is situated on a strip of land between the river and the Cayuga Marshes. . . . The salt works and the whole establishment are owned by a company, of whom Mr. Andrews, a very fat man, formerly a tavern-keeper in Skaneateles, is the manager, and his intelligence and activity qualify him for the trust. . . . It takes from 80 to 100 gals. to make a bushel of salt here. Near 2,000 bushels have been made since November last. Salt sells for three shillings a bushel, and twenty shillings a barrel at the works. There are several springs.

"The principal one that supplies the establishment is in the middle of a fresh water creek. The salt water is extricated from below the waters of this stream. The Indians had discovered a spring near the marshes by digging twelve or fourteen feet, where they made salt. On the site of this old spring a well is now digging for the fossil salt, and has been sunk to the depth of 102 feet. The lower they go, the salter the water is found. This manufactory contains eighteen kettles and twelve pans; each arch contains two kettles and consumes a cord of wood in twenty-four hours. Excellent basket salt is also made here."

We learn therefore, from this very interesting article that in 1810, three years after the discovery of the salt water in Salt

Creek, that the spring was supplying most of the salt for the Cayuga Manufacturing Co. who owned the entire works situated at Montezuma.

Although Clinton does not give us the number of kettles and pans employed at the works at Salt Creek, he does tell us that eighteen kettles for boiling and twelve pans for evaporating purposes were in use at the well drilled on the west side of the ridge by the Cayuga Mfg. Co. in 1810, a description of which we have given in a previous paragraph, together with an analysis of the brine.

In the year 1813 a second well was sunk by the Company, this time on the eastern side of the ridge, and a good quantity of brine was found at a depth of eighty feet. From this date until 1824 we find no record of any other wells being drilled. However, in 1824 a third well called the "New Well" was drilled to a depth of 120 feet. The brine from this well was of sufficient strength to produce about 18 ounces of salt to a gallon which was about the same proportion that Comfort Tyler speaks of in his description of the first well.

From the time of DeWitt Clinton's visit in 1810 up to the year 1813, when Spafford's Gazetteer of that year tells us 60,000 bushels were produced, the industry was in a most flourishing condition. Indeed, the year 1813 may be considered the high water mark of production, for by 1824 the yield had fallen to about 18,000 bushels, which gradually decreased to a few hundred in 1840.

This failure of the industry at Montezuma was undoubtedly due to the following causes. In the first place the pump works used for forcing the brine from the wells into the kettles or pans were of very rude manufacture, the power employed being that of horses or even at times by hand. The tubes used in carrying the brine from the wells to the works were so imperfectly constructed that fresh water constantly flowed in and reduced the strength of the brine. Again the grounds upon which the works were erected were owned by private individuals, and the manufacturer was obliged to purchase or lease it besides erecting his works. At Syracuse, on the contrary, the grounds were leased without charge to those wishing to engage in the manufacture of salt. This made the cost of production at Montezuma much higher than at Syracuse and this inability to compete in price with the Syracuse salt was one of the chief reasons for the failure of the works. The inferior strength of the brine also operated unfavorably upon the Montezuma works. In connection with this a comparative table showing the strength of the different brines found at Syracuse and Montezuma up to the year 1840 is here given. The table appeared in Lewis C. Beck's "Mineralogy of New York State," published in 1842.

Table showing the Composition of various brines from Syracuse and Montezuma in 1000 parts of brine.

	1	2	3	4	5	6	7	8
Carbonic acid...	0.06	0.07	0.09	.007	...	0.08	...	...
Oxide of iron and silica with a trace of carbonate of lime.	0.04	0.02	0.04	.003	...	0.02	...	...
Carbonate of lime	0.10	0.14	0.17	.013	8.50	0.18	0.02	...
Sulphate of lime	4.93	5.69	4.72	4.04	...	5.25	4.31	...
Chloride of magnesia	0.79	0.46	0.51	0.77	...	1.00	0.30	...
Chloride of calcium	2.03	0.83	1.04	1.72	...	1.40	1.53	...
Chloride of sodium (pure salt)	130.66	132.39	140.02	142.85	173.50	93.35	73.72	...
Water, with a trace of organic matter, etc.....	861.39	860.40	853.41	850.39	818.00	898.72	920.12	870.67
Total amount of solid matter in 100 grs. of brine	138.55	139.53	146.50	149.54	182.00	101.20	79.88	129.33

- 1—From a well at Geddes, adjacent to Syracuse.
- 2—From the old well at Syracuse.
- 3—From the old well at Salina, adjacent to Syracuse.
- 4—From the well at Liverpool, adjacent to Syracuse.
- 5—From the new well at Syracuse.
- 6—From a well at Montezuma previous to 1840.
- 7—From the first well at Montezuma, 1810.
- 8—From a new well at Montezuma, 1840.

From this table it will be seen that none of the brines from Montezuma are equal in strength to those of Syracuse and vicinity.

During the year 1840 an attempt was made to resuscitate the fast dying industry at Montezuma and an act was passed by the Legislature appropriating an amount of money to procure, if possible, a supply of brine of sufficient strength to be used advantageously in the manufacture of salt. The shaft was sunk down two hundred feet and opened up a vein of brine stronger than any heretofore found at this place, which can be seen from an examination of the above table, the analysis of this well being exhibited in column eight. However, even this well did not approach the strength of the Syracuse wells, and it was not long before the manufacture of salt entirely ceased at Montezuma.

About 1858 to 1860 the State obtained ownership of the lands and for a short while the manufacture of salt was again resumed,

but the activity did not last long, and finally ceased from the same causes which attended the failure of the industry in 1840, even though one of the causes of the earlier failure, namely, the private ownership of the lands was eliminated.

Before we close the history of salt in Cayuga County we must make mention of one isolated well at the village of Aurora, on the eastern shore of Cayuga Lake, about twenty-one miles from Ithaca. This well was drilled for Mr. E. B. Alvord, of Syracuse, N. Y., to a depth of 1,068 feet, but so far as can be ascertained, was never used to any extent for the manufacture of salt. I am unable to find out the exact date of the drilling of the well, but it was previous to 1885.

Mr. I. P. Bishop in his report on the "Salt Industry of Western New York," published in 1886, gives a short description of this well which is as follows:

"The well was afterwards drilled deeper with no further indications of salt. No rock salt was brought up by the sand pump in sinking this well. I have reliable authority for stating, that after excluding the brine from above the saline rock and allowing the water in contact with the salt layer sufficient time for saturation, the brine thus produced showed between 60 degrees and 70 degrees by the salometer. There seems to be no doubt then, that there is no rock salt at Aurora. While one boring is not sufficient to determine whether the rock salt extends so far to the east, the location of the well, so far south in the Hamilton rocks is just where we have the best reason for expecting it. For, between the Oatka district and Canandiagua Lake there has been no well sunk from the outcrop of the Hamilton but that has found rock salt in abundance, and usually within 1200 feet of the surface. Any further borings east of Cayuga Lake will be of great geological interest."

No borings have been made east of Aurora since the date of Mr. Bishop's report to the writer's knowledge. However, fifty-five years before the date of Mr. Bishop's report a well was sunk near Delhi in Delaware County, in 1833, which was four hundred feet deep. Delhi is 94 miles east of Aurora. This well does not seem to have been within the knowledge of Mr. Bishop at the time his report was written, in 1885, although an account of it is given in the New York State Assembly Document, No. 50, for 1840, and also in the State Geologist's report for the same year. An account of the Delhi well will be found under the head of Delaware County.

A table of the different geological formations passed through in sinking the Aurora well is herewith appended. The table is taken from the Bulletin of the N. Y. State Museum, Vol. 3, No. 11, by F. J. H. Merrill.

Aurora, Cayuga Co. (W. B. Cogswell)

Soil	5	feet
Blue Clay	10	"
Gravel and Shale	95	"
Slate	245	"
Fine Black Sand	20	"
Slate (cased off at 485 feet)	110	"
Slate	15	"
Corniferous Limestone	175	"
Slate (strong flow of brine 500 ft.)	30	"
Limestone (gives sand)	25	"
Slate	100	"
Gypsum (strong brine 840 ft.)	108	"
Salt Rock, later found to be salt shale	60	"
Shale	45	"
Gypsum	25	"
<hr/>		
	1068	

At Sterling, in the extreme northern part of the county, bordering upon Lake Ontario, a brine spring arises from a fissure in the sandstone. Another spring is located near Little Sodus Bay, about three miles from Sterling. Besides these, D. D. Luther in his "Brine Springs and Salt Wells of N. Y." states that a spring was found near McFarlans Mill, which is in this vicinity. Mr. Luther states that all of these springs issue from the rocks of the Medina epoch.

Salt springs also occur in the extreme southern part of the town of Cato, along the banks of the Seneca River. This locality is 20 miles from the salt works at Syracuse and ten from the old works at Montezuma.

It must be borne in mind that both at Sterling and Cato no wells were ever driven, nor was there any salt made at any time.

Chapter IV.

WAYNE, DELAWARE AND MONROE COUNTIES

WAYNE COUNTY lies on the southern shore of Lake Ontario, and is bounded on the south by the counties of Ontario and Seneca, on the east by Seneca, on the west by Monroe, and on the north by the Lake.

This County at the present time does not produce salt of any kind, nor has it done so for many years. In common with other localities throughout the State, the salt deposits and springs of Wayne County are not of sufficient strength for the manufacture of salt according to present day standards, and as has been stated above, no salt has been made within the borders of this county for many years.

Diligent search has failed to reveal the date when salt was first made in this county or the locality of the earliest workings. The most important of the early works were situated at Galen, in the township of Savannah, in the southwestern part of the county. Their location was at the western end of what is known as the Cayuga marshes, which is no great distance (about seven miles) from the salt works at Montezuma in Cayuga County, which were operated during the same period as those of Wayne County.

The principal works were known as the Galen Salt Works, and during the period of their existence which, so far as can be ascertained, was from about 1815 to 1820; they were in considerable repute. Buildings and machinery were erected at great expense, but they have long since been removed, and the manufacture of salt entirely abandoned. A chemical analysis of the Galen brine was made during the period of operation, and the result of this analysis in 1000 grains of brine was as follows:

Chloride of Calcium .....	.49
Chloride of Magnesium .....	.29
Sulphate of Lime	2.07
Carbonate of Lime .....	.09
Silica .....	.04
Chloride of Sodium (common salt)...	84.24
Water	912.78

From this analysis it can be seen that the proportion of chloride of sodium or common salt is small as compared with other brines, and this fact no doubt was the reason of the early abandonment of the works.

However, sometime during the year of 1843, a salt spring was opened at Lockpit, in the town of Galen, about eight miles west of Montezuma, Cayuga County, and on the western border of the great Montezuma marsh, which compared favorably in point of strength with the Syracuse brines. The boring attained the depth of about 400 feet. An analysis was made of this brine in November, 1843, by Prof. Lewis C. Beck, at that time mineralogist of the Geological Survey of New York State, and author of the "Mineralogy of New York State," which today is still an authoritative work on the subject. The results of this analysis in 100 grains of brine were as follows:

Chloride of Calcium and other impurities...	5.97
Sodium Chloride (pure salt)	18.78
Water	72.25
	100.00

The strongest Syracuse brine at that date contained in 100 grains:

Sulphate of Lime and other impurities.....	0.85
Chloride of Sodium (pure salt)	17.35
Water	81.80
	100.00

The Lockpit brine, therefore, while containing a larger percentage of salt than the Syracuse brine, also contained a larger amount of impurities, which would necessitate greater care in the evaporation of the brine. Twenty-eight or thirty gallons of brine of this strength would yield a bushel of salt. Prof. Beck states, "If this brine should be abundant and the location favorable, salt might be advantageously manufactured from it by the solar evaporation process. Should the mode by boiling be pursued, great care will be required in removing the deliquescent chlorides, by long drainage of the salt, or by washing it with strong brine before it is put up for use." Salt, however, was never made extensively from this well.

About 1850 a boring was made at Galen, at about fifty rods from the Erie Canal, and the well was sunk to a depth of 230 feet, from which quite strong brine was forced up with great violence by some form of gas, probably carburetted hydrogen. This well, however, soon suffered the fate of its predecessors in this locality.

Borings also were made in the year 1832 by a company in the vicinity of the village of Clyde, in the township of Galen, and the brine at first yielded twenty ounces of saline matter to a gallon. These too were unsuccessful, one of the wells instead of the

looked-for brine, emitted inflammable gas, and the well soon after was filled up. Another well became diluted with fresh water and soon ceased to flow. As late as the year 1842, gas occasionally issued from this tube.

A brine spring also existed two miles east of Clyde, but I have been unable to find out whether salt was ever made here or not. Salt was also made in small quantities at a spring situated about two miles from the village of Lockville in the township of Galen.

We will now turn to other localities in the county. In the township of Sodus, facing on Lake Ontario, salt was made during the years 1831-1832. The exact spot I have been unable to determine. A brine spring also exists at the head of Little Sodus Bay, on the border line between Wayne and Cayuga Counties. From 140 gallons of this brine only one bushel of salt could be made, which proportion is far too small for the proper manufacture of salt.

Salt also has been made in the township of Ontario, in the northwestern part of the State. Diligent search has failed to reveal either the locality or the date of manufacture. A brine spring also exists on the banks of the creek north of Walcott Furnace, in the northeastern part of the county. Salt was made at this spring in 1815, the product being of a reddish hue, due to the fact that the spring arose from the red sandstone.

With these instances the history of the manufacture of salt in Wayne County is completed.

SALT IN DELAWARE COUNTY.

According to most authorities, salt deposits and springs are not found east of Saltspringville, in Otsego County, about 14 miles north of Cooperstown, and in nearly the same parallel of latitude in Delaware County. It is with the latter county we are now concerned.

In 1823 a brine spring was discovered upon Elk Brook about four miles northeast of the town of Delhi, in Delhi township. A well was sunk to a depth of four hundred feet, three hundred and fifty being through rock. During the boring several veins of salt were found, from which some salt was manufactured. Several hundred barrels were manufactured, and the product was very white and a superior article for table use. There were eight kettles in the establishment, making about ten bushels of salt per day, and the fires which were used to heat the kettles consumed two cords of wood per day. An account of this spring can be found in the New York State Assembly Document, No. 50, for 1840, and also in the State Geological report for the same year. It is from these sources that the facts related above are taken.

Salt also was made by the early hunters and trappers at a spot three and one-half miles northeast of Colchester, on a branch of Downes Brook. When Wm. W. Mather, Geologist of the First District of New York State, visited this locality in 1840, the well had ceased to be used, and the water was not perceptibly saline to the taste. Due, no doubt, to the fact that if a salt well is neglected, the casing rots and fresh water from other strata seeps in and weakens the brine.

Although, as we have stated before, salt, up to the present day has not been found east of these localities, it is interesting to note what Wm. W. Mather in his report on the First Geological District, published in 1843, has to say about this subject.

"The basin or trough-form in which the strata are deposited renders it not improbable that brine might be obtained by deep boring in the valley of the Delaware, between Deposit and Narrowsburg, in the valleys of both branches of the Delaware, and the lower parts of the main tributaries; and possibly in the valley of the Susquehannah about Sidney, in that of the Mongaup, and of the Neversink above Cuddebackville." Now these localities are all southeast of Delhi, Colchester and Saltspringville, and the valley of the Neversink River at Cuddebackville is distant only 35 miles in a southeasterly direction from the Hudson River, at Fort Montgomery, opposite which on the east bank of the river is the mountain known as Anthony's Nose. During the winter of 1912-1913 a friend of the author's brought to his office a piece of good quality rock salt, such as is mined in Livingston County at Retsof and Cuylerville. This sample he claimed to have found upon Anthony's Nose. It is the earnest intention of the author to thoroughly investigate this at the earliest possible moment. It is my firm opinion that salt will ultimately be found as far east as the Hudson River if not upon Anthony's Nose, at some other locality fully as far south. It is indeed fortunate that the strata runs in a southeasterly direction, as this will bring it very near to New York City, which is the greatest distributing point for salt in this country. Anthony's Nose is only 40 miles from New York, and any salt works in that locality will enjoy a most favorable freight rate into New York City.

SALT IN MONROE COUNTY.

Monroe County, named after the fifth president, James Monroe was formed from the counties of Ontario and Genesee, in 1821. It lies upon the southern shore of Lake Erie, and is bounded on the east by Wayne County, on the south by Ontario and Livingston, on the west by Orleans and Genesee, and on the north by the Lake.

Monroe County can hardly be given a place in any history

of the salt producing counties of the State, as salt was made in isolated instances by the early settlers merely to supply their own immediate wants or the wants of their fellow townsmen. The few salt springs that exist arise from the indurated marl of the Medina sandstone. They were soon abandoned when transportation facilities were increased, as salt could be brought from the Syracuse works at a much cheaper price than it would be manufactured at home. When the geological survey of the State was made during the years 1837 to 1842, the springs and wells had become so diluted with fresh water from lack of attention, that their saline taste was hardly perceptible.

The earliest known instances of salt making by the first settlers were at the towns of Clarkson, in the western part of the county, along the bank of Salmon Creek, and at Webster, near Irondequoit Bay in the eastern portion, during the years 1810 to 1825. Another spring worked at about this period was at the town of Greece, two miles north of the Ridge road and distant about nine miles west from the city of Rochester. Other salt springs were of frequent occurrence throughout the county, and salt was manufactured from them by the early settlers in small quantities.

Chapter V.

WYOMING COUNTY.

WYOMING COUNTY takes an important place in salt annals, for it was within the confines of this county that rock salt was first discovered in New York State. For some time thereafter the county took a predominant position in salt production, making more of the product than any other part of the State. Due to the wide extent of the salt strata throughout the county, and the ease with which it could be reached, too many plants were erected, and overproduction was the result. Failures followed this state of affairs, and today only three plants are in existence. In the vicinity of Warsaw, abandoned blocks are met with on every side and are a mute reminder of the great industry which flourished during the "eighties" and early "nineties" of the past century.

The failure of the National Salt Co. in 1904, played an important part in the downfall. This company had bought up most of the plants in the county then in operation, and when it failed as a result of bad management and overproduction, it was evident that the International Salt Co., who purchased the assets of the defunct corporation, would have to shut down many of the plants, as more salt was being made than could be consumed. The Wyoming County blocks were the ones abandoned, as they had only rail transportation, and most of them did not have the latest type of machinery installed.

An article from the Buffalo "Express" will give the reader a good idea of the reasons for the decay of the salt industry in Warsaw, where most of the plants in the county were situated. The article was written some time after the failure of the National Salt Company :

"A VILLAGE AND A TRUST."

"According to a dispatch in the Rochester Post Express, the last of the remaining salt plants in the village of Warsaw is being dismantled and the machinery is being moved away. Twenty years ago Warsaw was the center of the greatest salt-producing district on this continent. The valley was full of wells, and there were at one time no fewer than ten plants for refining the salt in operation in the village. Other plants were worked in surrounding villages and the whole district enjoyed a boom.

"Then came a trust. 'If you want to make salt, keep all these plants going; if you want to make money, shut part of them

down,' was the principle declared by one of the trust promoters in reply to the protests of a local manager who still retained some foolish pride in the idea that his business was benefiting the community in which he lived as well as himself. So plant after plant was closed and the salt industry was organized on the modern basis, with high capitalization and strenuous struggles to maintain monopoly and keep up prices. One trust paid six per cent. on its common stock one year and in less than two years afterward was in the hands of receivers. Reorganization followed.

"Perhaps the salt industry would have lasted no longer so far as Warsaw was concerned even if it had been kept in the hands of small competitive companies doing business in the old-fashioned way. Salt has been found to be much more widely distributed throughout the United States than it was supposed to be when the Warsaw deposits were discovered. Transportation advantages would still have figured in the problem. The reason now given for abandoning Warsaw is that salt can be made most profitably at points where there is water as well as rail transportation. If Warsaw had had the good fortune to be on the line of the Erie Canal, it might have kept its industry. That is a suggestion which Rochester and some other towns that do not appreciate their canal advantages might well think about. But it is a general rule that small companies of local capitalists are more likely to keep an industry going, with small profits, through pride in their town and their business than are big combinations."

As intimated previously, overproduction, with consequent ruinous competition played a big part in the downfall of the industry, and to vividly portray this state of affairs we will have recourse to a letter written by a salt manufacturer to the Warsaw "New Yorker," and published in that paper about the time that overproduction began to make itself evident:

"A SICK MAN IN WARSAW.

"The New-Yorker also contains the following from a sick man:

"Mr. Editor: I have always taken great interest in your valuable paper, and particularly in your 'salt column.' You as well as all of the 'wholesale correspondents' have 'boomed' the industry for the last three years, and thinking it might be well to hear the manufacturers' side of the story, I will give you a few facts. Some four years ago, when the salt from this new field first came into market, it was supposed that our salt, in consequence of its great purity, would drive out every other salt. The manufacturer knew that he was making not only the best, but the only good salt that was ever made, and that it was only a question of time when Syracuse and Saginaw would have to

give way to us. Things have changed, however, and we begin to learn that a barrel of salt is a barrel of salt in nine cases out of ten, and the party selling the cheapest will get the order, no matter where it is made. I will except, however, the fine grades, but as only about 5 per cent. of the total consumption is fine salt, the quantity is not large. When men get the "salt bee in their bonnet," they are bound to go into the manufacture of the article. All the newspapers say the demand is unlimited, that there is a fortune in the business, and as newspapers always tell the truth in the go, this state of things has existed for about four years, until there are twenty salt works in operation in the field with an annual capacity of about 3,000,000 barrels. A new question seems to have come up lately, that is, what are we going to do with all this salt? Our store houses are all full, and we cannot sell it. Syracuse has a large quantity on hand, so has the Ohio River district, while the salt association of Michigan has in its storehouses the enormous quantity of 1,600,000 barrels, or 16,000 car loads. If all this salt was loaded onto cars with 100 barrels in each car, the train would be over 100 miles long. When there is such a vast overproduction of any commodity, there can be but one result, that is, prices invariably go from bad to worse, until the article is sold below the cost of production and manufacturers are forced to stop business and let the demand regulate the supply. This field is now producing more salt than can be marketed, and we are selling at prices that will not keep our works in good repair, to say nothing of a small income from money invested.

MANUFACTURER."

Having given a brief resumé of the rise and fall of the industry in Wyoming County, we will now go into detail and concern ourselves with the discovery and use of that great and extensive bed of rock salt which underlies such a large portion of our State, and which has in no small degree contributed to the wealth and importance of the Empire State, and is today one of the principal industries within our borders.

During the close of 1877 and early spring of 1878, The Vacuum Oil Company of Rochester, was engaged in drilling a number of wells at various points in the western part of the State, in the hope of finding oil near Rochester, and on the line of the Rochester & Pittsburgh Railroad, which would give them a source of supply independent of the Standard Oil Company. Mr. C. B. Everest, President of the Company, had been at one time a resident of the village of Wyoming, situated in the town of Middlebury, at the northern part of the county. Due, perhaps, to his knowledge of the country and favorable geological indications, Mr. Everest directed that a well be sunk on the farm of Mr. C. B. Matthews, one mile south of the village. Here at this well,

on June 20, 1878, a bed of rock salt seventy feet thick was discovered, the first of its kind to be found in New York State.

The actual drilling was done by Mr. Henry Thomas, of Bradford, Pa. The drill was started on April 12, 1878, and passed through 600 feet of Genesee, Hamilton and Marcellus shales at the rate of 80 or 90 feet per day. The formation of the Helderberg range were passed through, the surface water being effectually shut off by 240 feet of casing. Forty feet of water lime formation was next passed through and the drill went down through the varying shales of the Onondaga salt group. At a depth of 1260 feet a solid stratum of rock salt was found which proved to be 70 feet in thickness, and bushels of shining crystals of salt were brought to the surface by the sand pumps. The drilling was finally stopped at 1,530 feet, and the well plugged to prevent the impurities below the salt stratum from mixing with the brine when pumped. The well was soon tubed and a pump put in operation, proving that an inexhaustible supply of pure saturated brine could be obtained. A trial manufacture of salt was soon begun by solar evaporation as well as boiling in an iron pan by direct heat.

The Oil Company immediately leased a large tract of land in the locality with a view to salt production, but the company itself never did anything towards the manufacture of salt, in spite of their statements when leasing the land.

During 1879, Mr. Sylvester Lewis, the inventor of the Lewis System of salt manufacture, described in the chapter on Livingston County, leased two lots in the vicinity which had not been taken up by the oil company and endeavored to form a company for the purpose of manufacturing salt. He had previously been a salt maker at Syracuse, and the interesting discovery of rock salt naturally attracted his attention. It was hard sledding, however, and Mr. Lewis might never have had the distinction of being the first man to make salt from the rock in our State if it had not been for an opportune occurrence, for his two efforts at organization failed at the last moment, through "cold feet" on the part of some of his friends. In 1879 the property of the Vacuum Oil Co. was transferred to the Standard Oil Co., and the salt well, together with appliances and their lease, was offered for sale. This gave Mr. Lewis his opportunity, and together with George L. Cornwell and Thomas Moulson, he purchased the property and formed the Wyoming Valley Salt Co.

On September 6, 1879, the company began the building of a very small plant which was finished in February, 1880. The block only produced 40 barrels per day, but it was a beginning, and Mr. Lewis had the honor of being the pioneer. The first saleable salt was made on March 1, 1881, and Mr. Lewis' son,

Stephen F. Lewis, drew it from the pans. In the following April the first shipment of 100 barrels was sent to Mr. Moulson at New York. Thus started an industry which has grown to huge proportions and is no inconsiderable star in the diadem of the Empire State.

In spite of the auspicious beginning, the life of the Wyoming Valley Salt Co. was rather checkered, and two years later the plant was abandoned, owing to disagreements among the gentlemen of the company.

Complete record of the well is as follows:

Soil and Clay	40	feet
Blueish Shales	40	"
Black Shales	220	"
Limestone	10	"
Slates of Variable Color.....	363	"
Limestone	100	"
Corniferous Limestone, bitter water below..	92	"
Gypseous Shales	405	"
Rock Salt at 1270 feet.....	70	"
Red Shale	190	"
<hr/>		
Total	1530	"

Shortly after the erection of the pioneer works at Wyoming, the Globe Salt Co. sank a well and erected a small plant at the village of Wyoming, and north of the pioneer plant. The capacity was only 80 barrels per day, and the plant did not last long, ceasing operations previous to 1888. The Lewis system was employed. Record of the well:

Salt was struck at.....	1220	feet
Salt and Shale Mixed	20	"
Solid Salt	81	"
<hr/>		
Total	1321	"

The discovery of rock salt at Wyoming village, the actual manufacture of the article by the two small plants just mentioned, and the finding of salt at LeRoy, in Genesee County, created considerable interest and speculation among the business men of Warsaw, the county seat. As a result, during the spring of 1881, some prominent men of the town, among whom were Hon. Augustus Frank and E. O. McNair, instituted weekly meetings of the business men of the place to devise ways and means whereby the commercial prospects of the town might be advanced. At one of these meetings it was decided to sink a

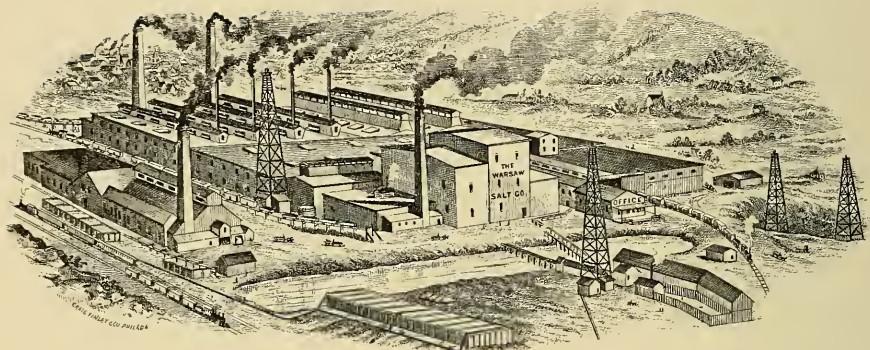
well and ascertain if possible, whether oil, salt or other minerals existed in paying quantities in that locality. \$5000 was quickly subscribed by eighty-five business men, and a company known as the Warsaw Mining Co., was organized.

In August, 1881, the company began sinking the desired well in the northern part of the town, close by the tracks of the Rochester and Pittsburgh Railroad. During the following October, to the great delight of the subscribers, a salt-bearing strata of 111 feet in thickness, with 75 feet of solid salt was encountered at a depth of about 1530 feet. An abundant water supply for brine was also found in the well. For three months the well was subjected to constant trial pumping, which demonstrated the brine to be fully saturated, of unsurpassed purity, and in unlimited quantities. In the first part of July, 1882, the company began the erection of a plant for the manufacture of salt, and increased its capitalization to \$25,000. A storehouse, suitable tanks and an evaporating department containing an open iron pan 100 x 20 feet, were erected. By the following November, the plant was completed, with a capacity of 100 barrels per day, and in the latter part of the same month the first salt was made. The fine quality of the product attracted considerable attention, and additional capital for the enlargement of the works and the sinking of further wells was not found wanting. We append herewith a record of one of the wells, which is typical of the others:

Surface Soil, Clay	16	feet
Shale	940	"
Corniferous Limestone	156	"
Lower Helderberg and Shale	430	"
Shale and Salt Mixed	30	"
Salt	6	"
Shale	10	"
Salt	70	"
<hr/>		
Total	1658	"

As soon as the manufacture of salt was assured, the name of the company was changed to the Warsaw Salt Mining Co. Six wells in all were sunk, five of which were 3 $\frac{1}{2}$ inches in diameter, and one eight inches, which at the time was the largest well sunk in that district.

An analysis of the salt produced by this company was made in 1884 by the noted London chemist, W. M. Habershaw. It showed the salt to be the finest then produced anywhere, and is a good analysis for even today with our improved processes of manufacture.



WARSAW SALT COMPANY
Warsaw, Wyoming County, N. Y.

Pure Salt	98.8929
Sulphate of Lime .....	.7230
Chloride of Magnesium	None
Chloride of Magnesium	None
Insoluble Matter	None
Moisture .....	.3341
Sulphate of Magnesia	None
	<hr/>
	100.0000

An additional analysis made by Dr. F. E. Englehardt, State Chemist at the time, also proved the high quality of the product.

In March, 1883, the plant of the Warsaw Salt Mining Co. was sold to an English syndicate represented by Mr. John D. Wing, of New York, who assumed the office of President in the new company which was known as the Warsaw Salt Co., the word "mining" being dropped, as it was misleading. The new owners greatly enlarged the plant, sank additional wells, and brought the production up to 800 barrels daily. Mr. John H. Duncan, a gentleman well versed in the manufacture of salt, was engaged as manager. The complete list of officers after the reorganization was as follows: John D. Wing, President; Richard Irvin, Vice-President; John H. Evans, Treasurer; Francis S. Morgan, Secretary; J. Morgan Wing was elected Treasurer in place of Mr. Evans some time later. Mr. Duncan also later left the company to erect a salt plant of his own, which afterwards became the Worcester Salt Co.

For many years the Warsaw Salt Co. continued in business, and its product always had a high reputation for quality. When the National Salt Co. was formed in 1899, this plant was one of those bought up; but unlike some of the others, the plant was not abandoned, but continued to manufacture salt under the ownership of the National. In 1904, when the properties of the defunct National Salt Co. were sold at Receiver's Sale and purchased by the International Salt Co., the Warsaw plant of course was included, and was operated by this company until about 1906, when it was shut down.

Although the plant in common with others in the county, did not enjoy water transportation, it was operated by the International until the time mentioned, as it was a very complete block, and was equipped to manufacture all grades of salt.

The following extract culled from the Receiver's Sale circular, gives an idea of the works when bought by the International:

"SIXTH PARCEL.

"The plant in the town of Warsaw, Wyoming County, New York, formerly operated by the Warsaw Salt Company, includ-

ing about sixty (60) acres of land, with six salt wells, one eight-inch diameter, and mining rights; also one office building, one mill building for refining; one grainer building, three grainers; one pan building, four open pans; one pan building, one pan; one storehouse, capacity 6,000 tons; one cooper shop; one blacksmith shop; brine tanks, derricks, pipe lines, boiler house containing seven boilers aggregating 700 h.p.; all fixtures, machinery and tools, two railroad spurs."

CRYSTAL SALT CO.

At Saltvale, about 4 miles north of Warsaw, the Crystal Salt Co. began sinking a well on July 12, 1882. The record of the well is as follows:

Sand, Gravel and Quicksand	136	feet
Shale	634	"
Corniferous Limestone	146	"
Shale	15	"
Upper and Lower Limestone	394	"
Shale and Salt	50	"
Solid Salt	61	"
<hr/>		
Total	1436	"

A second well of about the same record was subsequently sunk.

During the latter part of 1882 and the early months of 1883, a plant was erected having a capacity of 1200 barrels daily. The first salt was made on May 8th, 1883. Large open pans were used.

Several innovations in well pumping were put into effect by this company, and as a good description of them is given in Vol. 3, No. 11, of the New York State Bulletin, by F. J. H. Merrill, we will quote from that publication: "At Saltvale, the process employed by the Crystal Salt Co. is based on the theory that it is preferable to take the brine from as low a depth as possible, because there is a tendency for the strong brine to become stronger at the expense of the weaker brine above, and besides, the brine on account of greater specific gravity, sinks to the bottom below the water. For this reason it is better to pump brine up the tubing rather than up the casing because the tube is forced to take the saturated brine while the casing, not being down to the bottom, as it ends several feet above, is forced to take the less saturated brine.

"The forcing principle, i.e. the forcing down one and up the other, is said to have been invented by the Crystal Salt Co., and is used by them for connected wells and isolated wells. The

capacity is obviously greater for there is no limit to the amount of water which may be forced into a well except the capacity of the pumps and the size of the cavity already made, a larger cavity producing a greater degree of saturation, on account of a longer period of contact with the salt. In the old method in which a lifting pump is used, the capacity depends on the cylinder and length of stroke."

Another innovation instituted by this company was the use of paper bags for salt, to be filled by the grocer from a large sack of bulk salt. Many advantages were claimed for this idea, and we quote herewith from one of the circulars issued, describing the system:

"The long felt want of a SUBSTITUTE (that is a package that would NOT gather MOISTURE) for the ordinary cotton pocket in which TABLE SALT has been put up for many years, has at last been found in the NEW SALTVALE POCKETS. THE CRYSTAL SALT COMPANY has been experimenting in this line for some time, and have finally succeeded in getting a paper especially manufactured for the purpose of a material and finish that will not attract moisture.

"The ordinary cotton pocket after a barrel lot has been put on the shelf in the store, from the nature of the material from which they are made soon become soiled, dirty, and some of them unsalable. To OVERCOME this, we now put the TABLE SALT up in an extra FINE CLOTH SACK of sixty pounds only, and on the top of the salt in the sack we put the empty SALTVALE POCKETS, twenty or twenty-two threes, or twelve fives, or six tens, or make an assortment of sizes as the buyer may choose. The sixty pound package with the empty SALTVALE POCKETS contained therein, is opened at the retail store, and the twenty threes, or twelve fives, or six tens, are put up fresh each day, or as wanted, by the same help that put up the sugar, tea, coffee, and other staple articles, as is now customary in the ordinary retail store, thus always insuring DRY, CLEAN, FRESH packages for TABLE SALT. THE SALTVALE POCKET is a short thick pocket, with a flat double bottom, so that it will stand easily on the shelf without falling over or down, and the natural fold of the package at the top will of itself shut down over the salt left in the pocket, thereby keeping the salt covered and clean all the time.

"The cost of pocket salt is reduced nearly 25 per cent. by this system. Sixty pounds of salt with either of the three stock sizes of pockets threes, fives or tens, are sold at one price. The regular package provides only for full weight pockets, but for a small additional cost, extra pockets will be put in each package so that dealers who have trade for light weight packages can get the additional number of pockets from the original package if they choose. Besides the regular stock package of Saltvale

pockets, we put up what we call Saltvale pockets extra, which means that the outside package is made of a fine toweling, to give value to the sack when empty. The expression of opinion of a few very large dealers whose attention has been called to this package is, that it will meet with universal favor, and will eventually supersede the use of the cotton pocket.

"We take great pleasure in offering this new package to the trade and shall be glad to quote prices on application, and give particular attention to any inquiries concerning the new Saltvale pockets."

The extra time and bother involved in the use of this system of selling salt was underestimated and the plan was not successful. We have never heard of it being tried since.

The following analysis of this company's salt was made by W. M. Habershaw, the eminent London chemist. The sample to be analyzed was taken at random from the bin. The analysis was made some time previous to 1885:

Insoluble Matter .....	.25
Moisture .....	.52
Sulphate of Lime	1.87
Chloride of Calcium (Mg. So. 4).....	.02
Chloride of Magnesium (Na. 2 So. 4.) .....	.25
Pure Salt	97.09
<hr/>	
	100.00

During the latter part of 1888 the plant was partly destroyed by fire, but was reconstructed in 1889. Crude oil had been employed as fuel in the old block, and the use of this fuel was continued in the new works. A tank with a capacity for twenty-five tank cars was constructed.

During 1909, a new company was formed to operate the plant which had been idle for some years. The prime mover in this enterprise was Mr. William Hunter, who had been connected with the old company for thirteen years. Mr. Hunter was a practical salt maker, and assumed the duties of superintendent. The new company had the following officers: Edward Russell, of Batavia, President; C. S. Rauber, of Rochester, Vice-President, and Andrew W. Skelley, of Batavia, Secretary and Treasurer. The corporation formally took over the property on April 1st, 1909. The first name chosen for the new organization was the Oatka Crystal Salt Company and later the Standard Salt Company was suggested, but both these names were in use by other concerns already incorporated, so the final choice rested upon the Imperial Crystal Salt Company, by which name the company was known.

The organization was short-lived, however, and in October,

1909, a new syndicate obtained control and the name changed to the Star and Crescent Salt Company. Under this Oriental appellation, a new company largely of Rochester capital, was formed, and for the details we refer the reader to the following clipping from a Rochester newspaper of that period:

"ROCHESTER MEN INTERESTED IN NEW SALT COMPANY THAT HAS ENTERED THE INDEPENDENT FIELD."

"Several Rochester men are interested in the organization of the Star and Crescent Salt Company, whose incorporation papers were filed recently in Albany. The officers elected Thursday are: President and general manager, William Hunter, Warsaw; Vice-President, W. E. Hoyt, Rochester; Secretary and Treasurer, Charles J. Cheney, Warsaw; Financial and Sales Manager, Charles A. Jordan, of Rochester.

"The company took over the old Crystal mine, which is about three miles south of Warsaw. The plant consists of seventeen acres of land, with railroad siding and main buildings 218 by 357 feet. The plant is being entirely reconstructed, with twenty-five men now being employed. When the work is started, it is estimated that from seventy-five to a hundred will be employed.

"Among the directors, besides Mr. Hunter and Mr. Cheney, of Warsaw, are Louis F. Weber, W. E. Hoyt and Lawrence Schrank, all of Rochester. Several attempts have been made in the past few years to get this plant in working order, but all have failed until Mr. Hunter took hold of it. With the assistance of Mr. Jordan, of this city, the new company was made possible.

"It was reported in New York that the company had been absorbed by the International Salt Company, known as the salt trust, but this is denied by the Rochester men interested in the concern. They declare that the new company has entered the independent field. They say they have several large contracts to fill immediately.

"The new company is capitalized at \$100,000 of which \$40,000 in cash is paid in. The plant is said to have a daily capacity of 1,000 barrels."

Misfortune soon again fell upon the plant, and during 1910 operations were interrupted by suits between the promoters of the company and the stockholders. After a checkered career of several years the plant was purchased by a Mr. Bumm, a Philadelphia salt dealer. The plant is still run by Mr. Bumm's firm, although in a somewhat desultory fashion.

MILLER SALT CO.

During 1885 the Miller Salt Co. erected a plant a short distance north of the Warsaw works. Two wells were sunk. The record of the first one is as follows:

Shale, lower portage and Hamilton.....	935	feet
Corniferous limestone.....	147	"
Shale	12	"
Lower Helderberg limestone.....	400	"
Shale and salt.....	30	"
Solid salt.....	85	"
 Total	 1,609	

The method of pumping employed by this company is slightly different from that generally used and is described by F. J. H. Merrill in the Bulletin of the New York State Museum, Vol. 3, No. 11:

"The Miller Salt Co. runs the pipe down to the bottom of the well in order to secure only the saturated and heavier brine. The water is outside of the pipe furnished and comes both from above and from springs tapped in the hole. The brine is pumped up inside the pipe. This method necessitates but one hole, differing from the plan of having holes, one for forcing the water in and the other for the saturated brine to rise in."

The method of evaporation employed by the Miller Salt Co. was known as the steam kettle process and is similar to the old kettle system used at Syracuse, except that steam jackets are used instead of direct fire heat.

The capacity of the plant at the start was 150 barrels daily, which was increased to 350 barrels in 1886. The plant has been abandoned for many years.

ATLANTIC SALT CO.

Adjacent to the Miller works and almost adjoining it, a plant known at first as the Standard Salt Co. was erected about 1883. Only one well was sunk. Record as follows:

Surface soil, clay, etc.....	26	feet
Shale	874	"
Corniferous limestone	148	"
Limestone, shale and salt.....	440	"
Rock salt	57	"
Red shale (or sandstone).....	104	"
 Total	 1,649	"

The steam kettle process as described under the heading "Miller Salt Co." was used. The daily capacity was 125 barrels. About 1892, the name was changed to Atlantic Salt Co. The plant has been abandoned for many years.

GOUINLOCK & HUMPHREY

In the early part of 1883 Dr. W. C. Gouinlock, who had been engaged in the manufacture of salt in Canada, was attracted by the fast-growing salt industry of Wyoming County and came to Warsaw for the purpose of engaging in his favorite pursuit. He sunk a well near the Buffalo, Rochester and Pittsburgh station on the eastern side of the valley at Warsaw, and salt was struck at a depth of 1,640 feet on May 5th, 1883. On the same day salt was also struck at a well near the Erie station on the opposite or western side of the valley in which the village of Warsaw is located. This well was owned by Messrs. Steadman, Humphrey and Webster. Dr. Gouinlock and Mr. Humphrey soon joined hands and purchased the interest of the remaining owners. Additional wells were immediately sunk, one at each side of the valley.

Two plants were now erected, one on the eastern side of the valley near the Rochester and Pittsburgh station, owned entirely by Dr. Gouinlock, and another at the wells on the western side, owned jointly by Dr. Gouinlock and Mr. Humphrey. Large open pans were used and the combined capacity of the two blocks was 650 barrels daily.

Records of the two original wells:

Well at Eastern Side of Valley

Clay	17	feet
Shales	1,011	"
Corniferous limestone	148	"
Shales	75	"
Lower Helderberg limestones	300	"
Shale	45	"
Salt and shale mixed	37	"
Main salt bed	68	"
<hr/>		
Total	1,701	"

Erie Well

Shales	1,230	feet
Corniferous limestone	150	"
Struck salt at	1,803	"
Salt and shale	19	"
Shale	3	"
Salt and shale	12	"
Salt	24	"
Shale with a little salt.....	2	"
Salt	16	"
<hr/>		
Total	1,879	"

An analysis of Gouinlock's salt taken from the bin and analyzed about 1884 is herewith appended:

Moisture	1.315
Sulphate of lime	1.235
Chloride of calcium .....	.055
Pure salt	97.395
<hr/>	
Total	100.000

It appears that Dr. Gouinlock later bought Mr. Humphrey's interest in the Erie block, as he is recorded as sole owner when the National Salt Company bought the two plants in 1899. These plants were among those purchased by the International Salt Co. in 1904 when that company bought the property of the defunct National Salt Co. at Receiver's Sale, but while under the ownership of the National the Eastern or B. R. & P. block was dismantled, leaving only the brine tanks and salt wells standing. Both properties are still owned by the International but are not worked.

The following descriptions of the properties are from the circular of the Receiver's Sale:

"FOURTH PARCEL

"The plant in the town of Warsaw, Wyoming County, New York, located on the Erie Railroad, formerly owned by W. C. Gouinlock, containing about eighteen and two-thirds (18 2-3) acres of land; also one mill building for refining; one pan house, two open pans, one grainer, one storehouse, capacity 2,000 tons, one cooper shop, derricks, pipe lines, two salt wells.

The real estate is described as follows:

All that tract or parcel of land, situate in the town of Warsaw, County of Wyoming, State of New York, being a part of lot number forty-five in said town, bounded as follows: Beginning at the northeast corner of lands formerly owned by Luke Callan, and in the westbounds of the lands of the New York, Lake Erie & Western Railroad Company; thence north eighty-three degrees west, six chains and ninety-one links; thence north eight and one-fourth degrees east six chains sixty-six links; thence north eighty-three degrees west seven chains and sixty-one links to the west bounds of lands formerly owned by Benjamin Bishop; thence north four degrees east seven chains and fifty links; thence south eighty-three degrees east fifteen chains to the west bounds of said Railroad Company's lands; thence southerly along said Railroad Company's west line fourteen chains and sixteen links to the place of beginning, containing fifteen and sixty-seven

one-hundredths acres of land more or less; (together with all of the rights and privileges possessed by William C. Gouinlock and wife, which are identical with those possessed by the grantee in a certain deed bearing date the 28th day of June, 1883, given by Norman R. Steadman and others to the said William C. Gouinlock; and recorded in the clerk's office of Wyoming County in Liber 97 of Deeds at page 37; and subject to the reservations contained in said deed). Excepting and reserving from this conveyance, the portion of the above-described lands, one-half of which was deeded by the said William C. Gouinlock to the said Norman R. Steadman, April 21st, 1888, and a deed thereof recorded in said clerk's office in Liber 109 of Deeds at page 325. Also excepting and reserving the rights granted to the New York, Lake Erie & Western Railroad Company by deed recorded in said clerk's office in Liber 105 of Deeds at page 251.

Also all that other tract or parcel of land situate on said lot number forty-five, bounded as follows:

Beginning at a point one chain west of the northeast corner of the lands first above described; thence north eighty-three degrees west eleven chains; thence north four degrees east two chains and sixty-seven links; thence south eighty-three degrees east eleven chains to the west line of said Railroad Company's lands; thence south to the place of beginning, containing two acres and ninety-four hundredths of an acre of land more or less.

Also all that other tract or parcel of land on lot number fifty-one in said town of Warsaw, bounded as follows:

Beginning at the northeast corner of said lot; thence west on the north line of said lot seven chains and fifty links; thence south to the south bank of "Mill Brook" so called; thence east along the south bank of said stream three chains and eighty-four links; thence north to a point five rods south of the lot line; thence east on a line parallel with the north line of said lot and five rods distant therefrom to the east line of said lot; thence north five rods to the place of beginning, containing about one acre and twenty rods of land, be the same more or less, with the privilege of using the south bank of said stream in building and maintaining a dam, for damming back the water in said stream. Also all the rights and privileges conveyed by Catherine Schneckenberger to the said William C. Gouinlock and another by deed dated July 25, 1885, and recorded in said clerk's office in Liber 101 of Deeds at page 93. Also all the rights and privileges conveyed by Eliza M. Fargo to William C. Gouinlock and another by deed dated August 5th, 1885, and recorded in Liber 97 of Deeds at page 543, in said clerk's office. Also all the rights

and privileges conveyed by Norman R. Stedman and others to William C. Gouinlock and another by deed dated December 20th, 1886, and recorded in said clerk's office in Liber 109 of Deeds at page 50. Also all the rights and privileges conveyed by David C. Martin and wife to William C. Gouinlock and another by deed dated July 25th, 1885, and recorded in said clerk's office in Liber 101 of Deeds at page 92. Also all the rights and privileges conveyed by Chauncey B. Mason and wife by deed dated July 25th, 1885, to said William C. Gouinlock and another and recorded in said clerk's office in Liber 101 of Deeds at page 91. Also all the rights and privileges conveyed by Edwin C. Stearns and wife to W. C. Gouinlock and another by deed dated July 27th, 1895, and recorded in said clerk's office in Liber 101 of Deeds at page 94. Being the same premises conveyed to the National Salt Company by William C. Gouinlock and Margaret G., his wife, by deed dated the 31st day of March, 1899, and recorded in the Wyoming County Clerk's office in Book No. 124 of Deeds at page 417 on the 17th day of April, 1899.

FIFTH PARCEL

The property in the town of Warsaw, Wyoming County, New York, on the Buffalo, Rochester & Pittsburgh Railroad, on which was formerly located the plant operated by W. C. Gouinlock, but which has been dismantled and torn down; contains about eight (8) acres of land, upon which are located two salt wells, brine tanks and the mining rights.

The real estate is described as follows:

All that tract and parcel of land situate in the town of Warsaw, County of Wyoming and State of New York, being a part of lot No. twenty-nine in said town, bounded and described as follows:

Beginning in the south line of lands formerly owned by Augustus Frank, at the east bounds of the lands of the Buffalo, Rochester & Pittsburgh Railroad; thence east along said Frank's south line, sixteen chains and seventy-eight links; thence south four chains and ninety-one links to lands of the late L. W. Thayer; thence west along said Thayer's north line sixteen chains and eighteen links to the east bounds of said Railroad Company's lands; thence north along the east bounds of said Railroad Company's land, four chains and ninety-three links to the place of beginning, containing eight and nine one-hundredths acres of land, be the same more or less. Being the same premises conveyed to the National Salt Company by William C. Gouinlock and Margaret G., his wife, by deed dated the 31st day of March, 1899, and recorded in

the Wyoming County Clerk's office in Book No. 124 of Deeds, at page 416, on the 17th day of April, 1899."

EMPIRE SALT CO.

This company sank four wells and erected a plant on the Erie tracks south of the village of Warsaw in 1884. The grainer process was used at the block and the average depth of the wells was 1,960 feet. The thickness of the two salt veins was 70 feet. The daily capacity of the plant was 600 barrels, which was increased to 1,100 barrels in 1886. Nathan S. Beardslee of Warsaw was prominently connected with this organization.

In 1899 the company was bought by the National Salt Co. and the plant was purchased by the International Salt Co. in 1904, when that company took over the properties of the defunct National Salt Co. at Receiver's Sale. No salt has been made at this plant for many years.

The following description of the property has been taken from the Receiver's Sale circular:

"SECOND PARCEL

The land in the town of Warsaw, Wyoming County, New York, formerly owned by the Empire Dairy Salt Company, about fifteen acres of land, contains four salt wells and the mining rights appertaining thereto; twelve brine tanks, thirteen boilers set in brick, three brick stacks.

The real estate is described as follows:

All those certain tracts, pieces or parcel of land with the building and improvements thereon erected, situate, lying and being in the town of Warsaw in the County of Wyoming and State of New York, and particularly bounded and described as follows:

First—Beginning, all that tract or parcel of land situate in the town of Warsaw, County of Wyoming and State of New York, being part of lots number 43 and 44 in said town, bounded and described as follows: Beginning in the centre of Mill Brook (on said lot No. 44) in the westerly line of lands belonging to the New York, Lake Erie & Western Railroad Company; thence southeasterly along the westerly line of said company's lands one thousand and eighty-six (1,086) feet; thence due west four hundred and thirty-eight (438) feet; thence southerly to the centre of the highway leading from the village of Warsaw to the village of Wethersfield Springs at a point therein one thousand one hundred and thirty (1,130) feet west of said west line of said railroad lands

(measured in the said centre of said highway); thence west in the centre of said highway thirty-two (32) feet; thence northerly parallel to the thirdly described boundary to a point four hundred and seventy (470) feet due west of the southerly end of the first herein described boundary; thence due west to the centre of Mill Brook; thence northeasterly along down said centre of said Mill Brook to the intersection of the south line of lands formerly owned by James Barnett; thence east along the south line of said Barnett lands five (5) chains and sixteen (16) links to the southeast corner of said Barnett lands; thence north along the east line of said Barnett lands three (3) chains twenty-five (25) links to the centre of Mill Brook; thence northeasterly along said centre of Mill Brook to the place of beginning, containing thirteen (13) acres more or less. Also all and singular the rights, privileges and advantages contained and expressed in a certain agreement relative to water and the use thereof, made by William Birch with Nathan S. Beardslee and another, duly executed and acknowledged on the 12th day of June, 1884, and recorded in the office of the Clerk of the County of Wyoming, on the 14th day of June, 1884, in Liber 100 of Deeds at page 132.

Second—All that tract or parcel of land situate in the town of Warsaw, County of Wyoming and State of New York, bounded and described as follows: Beginning at the southeast corner of lot No. 44 in the said town, running thence west to the centre of the stream on said lot; thence northeasterly along the centre of said stream to the east bounds of said lot No. 44; thence south along the east line of said lot to the place of beginning, containing one (1) acre and twenty-four one-hundredths (24-100) of an acre of land. Together with all the rights and privileges of the party of the first part to build and maintain a dam and use water granted and conveyed by Alta D. Vincent to Nathan S. Beardslee and S. Benedict Whitlock by deed bearing date the 22d day of February, 1884, and recorded in said clerk's office on the 11th day of April, 1884, in Liber 95 of Deeds at page 484.

Third—All that tract or parcel of land situate in the town of Warsaw, County of Wyoming and State of New York, being part of lot No. 51 in said town, bounded and described as follows: Beginning at a point one (1) chain and twenty-five (25) links south of the northeast corner of lot No. 51, and in the east line of said lot; thence west parallel with the north line of said lot No. 51 three (3) chains and sixty-six (66) links to the line of lands heretofore deeded to William C. Gouinlock and L. Hayden Humphrey; thence south to the south bank of "Mill Brook" so called; thence southeasterly to the east line of said lot No. fifty-one (51) three (3)

chains and fifty (50) links south of the north corner of said lot; thence north two (2) chains and twenty-five (25) links to the place of beginning, the same containing more or less. Together with the exclusive right to enter upon and to build and maintain a certain dam across the bottom of the ravine on the north line of lands formerly owned by Hiram Stearns, deceased, being in lot No. 43, and to lay and maintain a water pipe and all the rights, privileges and advantages granted to the Empire Dairy Salt Company by Edwin C. Stearns in and by a certain agreement or instrument in writing bearing date the 16th day of April, 1884, and recorded in said clerk's office on the 14th day of June, 1884, in Liber 100 of Deeds at page 131."

HAWLEY SALT CO.

During 1884 the Hawley Salt Co. sank three wells and erected an open pan block on the Erie tracks southwest of Warsaw and just north of the Empire plant. The first two wells sunk had an average depth of 1,928 feet. The daily capacity of the block was 300 barrels.

This plant was one of those bought by the National Salt Co. in 1899 and turned over to the International Salt Co. at Receiver's Sale in 1904. No salt has been made for many years. We herewith append a description of the property from the Receiver's Sale circular:

"THIRD PARCEL

The properties in the town of Warsaw, said Wyoming County, consisting of the plant formerly operated by the Hawley Salt Company, about twenty acres of land, one office building; one boiler house containing two boilers aggregating two hundred h.p.; one pan house, four open steel pans; one grainer building; two steel grainers; one storehouse, capacity four thousand tons; one mill building for refining; one cooper shop; one blacksmith shop; brine tanks, derricks, pipe lines, fixtures, machinery, carts, picks and tools, two salt wells, three railroad spurs, three brick stacks.

The real estate is described as follows:

All that tract, piece or parcel of land, situate in the town of Warsaw, County of Wyoming and State of New York, described as follows: Beginning at a point on the east boundary of the New York, Lake Erie & Western Railroad south from the railroad station at Warsaw, and at the southwest corner of lands formerly owned by Silas Norton; being also the northwest corner of the farm and lands formerly owned by John W. Hawley; thence running easterly from said point

along the south line of the lands formerly owned by said Norton to the southeast corner of said land; thence running north along the east line of said Norton land to land formerly owned or occupied by Rose Vishon; thence running east along the south line of land formerly owned or occupied by said Rose Vishon and lands formerly owned by Charlotte Edsor and Lydia E. Hatch, to a point nine chains and fifty-eight links east and one chain and fifty links north from the place of beginning; thence running south to the center of the creek on the south boundary of lands formerly owned by John W. Hawley; thence running west along the center of said creek to the east boundary of said railroad; thence running northwesterly along said east boundary of said railroad to the place of beginning. Containing thirty and three-fourths acres more or less, all being in lot number forty-four in said town of Warsaw. Also all that other tract or parcel of land situate in the town of Warsaw, County of Wyoming and State of New York, and being a part of lot number forty-four in said town and bounded and described as follows: Commencing at the northwest corner of lands formerly owned by Mrs. Henry S. Hatch; thence west to lands formerly owned or occupied by Rose Vishon; thence south to a point from which a line running due east will intersect the southwest corner of the said Hatch land; thence north on the west line of the said Hatch land to the place of beginning, containing more or less. Being the same premises conveyed to the National Salt Company by the Hawley Salt Company by deed dated the 11th day of April, 1899, and recorded in Wyoming County Clerk's office in Book No. 124 of Deeds at page 405, on the 17th day of April, 1899. Excepting therefrom the following described premises: Beginning at a point in the west bounds of the land deeded to the National Salt Company by the Hawley Salt Company and due east of the center of the culvert under the Erie Railroad and over the creek known as Falls Brook; thence east twenty rods; thence north and parallel with the lands of the Erie Railroad Company eighty rods; thence due west twenty rods to the lands of the Erie Railroad Company; thence south along the lands of the said Railroad Company eighty rods to the place of beginning, and the right of way connected therewith. But the rights of laying and maintaining a pipe line over said premises are to be sold herewith."

PEARL SALT CO.

The works erected by this company were near the village of Pearl Creek, town of Covington, in the extreme northeastern part of the county. Two wells were sunk, one of

which was 1,194 feet deep with twenty feet of salt, and the other 1,182 feet deep with twenty-five feet of salt. The grainer system was used and the plant had a capacity of 300 barrels per day. The plant was probably erected in 1885 or 1886, the exact date cannot be ascertained.

George C. Otis was president, Z. Y. Lusk, vice-president, and J. C. Buxton, secretary and treasurer. Mr. Buxton also held the position of superintendent of the plant. The office of the company was situated at Warsaw.

This plant was one of those taken over by the National Salt Co. in 1899 and its fate was the same as others in the county which we have already enlarged upon. No salt has been made here since the organization of the National Salt Co.

A description of the property from the circular of the Receiver's Sale of the National's properties is herewith appended:

"SEVENTH PARCEL

The plant in the town of Covington, Wyoming County, New York, formerly operated by the Pearl Salt Company, including about twenty-six acres of land, with two salt wells and mining rights; also office building with brick vault; mill building for refining; storehouse capacity of 2,000 tons; foundation for one grainer building; one boiler house containing six boilers aggregating 600 h.p.; six rectangular brine tanks.

The real estate is described as follows:

All that tract or parcel of land situate in the town of Covington, County of Wyoming and State of New York, being part of lot number two of the Ogden Tract, bounded and described as follows:

Beginning at a stake in Samuel Park's west line nine chains and sixty-six links south of said Park's northwest corner; thence south two degrees thirty-three minutes west along said Park's west line twelve chains forty-four links to the middle of the State Road; thence north eighty-five degrees fifty-four minutes west along the center of said road twenty-three chains seventy-three links; thence north thirty-seven degrees fifty-seven minutes east five chains eight links to the northeast corner of lands heretofore occupied by Thomas P. Miller; thence north fifty-two degrees three minutes west along the north line thereof two chains ninety links to the center of the LeRoy and Warsaw Road; thence north thirty-eight degrees twenty-five minutes east along said center seven chains ninety-three and three-fourths links to a stake; thence south eighty-six degrees one minute east eighteen chains forty-eight and one-half links to the place of beginning, containing twenty-six and sixty-three one-hundredths acres of land, be the same more or less. Excepting and reserving

therefrom two and thirty-six one-hundredths acres now occupied by the Buffalo, Rochester & Pittsburgh Railroad Company, described in an order of the Supreme Court, recorded in Wyoming County clerk's office in Liber 78 of Deeds at page 487.

Also conveying another part of said lot number two in said Ogden Tract, in said town of Covington, bounded and described as follows:

Beginning at a point in the center of the highway running from Warsaw to Le Roy, which said point is north thirty-six degrees east one chain thirty-four links from the northwest corner of the store lot formerly owned by James C. Ferris; thence north thirty-six degrees east one chain seventy-five links; thence south fifty-four degrees east two chains eighty-six links; thence south thirty-six degrees west one chain seventy-five links; thence north fifty-four degrees west two chains eighty-six links to the place of beginning, containing one-half acre, be the same more or less.

Also another part of said lot number two of said tract, in said town of Covington, adjoining the last above described parcel:

Beginning at the northeast corner of the last above described parcel; thence north fifty-four degrees west two chains eighty-six links to the center of the highway; thence north thirty-six degrees east one chain fifty-three links; thence south fifty-four degrees east two chains eighty-six links; thence south thirty-six degrees west one chain fifty-three links to the place of beginning, containing sixty-eight rods, be the same more or less.

Also another part of said lot number two of said tract in said town of Covington, bounded and described as follows:

Beginning at the northwest corner of lands formerly owned by Benedict Brooks in the center of the state road leading from Moscow to Buffalo; thence south eighty-eight degrees east two chains nine links; thence north thirty-two and one-half degrees east one chain seventy-two links; thence north sixty-eight and one-half degrees west one chain seventy-five links; thence south thirty-six degrees west two chains forty-five links to the place of beginning, containing fifty-seven rods of land, more or less. Excepting therefrom all that tract or parcel of land situate in town, county and state aforesaid, bounded and described as follows:

Commencing at a point in the center of the highway leading from Attica to Geneseo on the line between lands owned by S. O. and B. Parks and land owned by Pearl Salt Company, running northerly sixteen rods; thence westerly five rods;

thence southerly sixteen rods to the center of the highway; thence easterly five rods to the place of beginning, containing one-half acre of land, be the same more or less. Also the water rights reserved to the National Salt Company in the deed made by it to Mrs. J. Ernest Sprague, dated August 23d, 1900, and recorded September 5th, 1900, in Liber 128 of Deeds at page 497. Being the same premises conveyed to the National Salt Company by the Pearl Salt Company by deed dated the 8th day of April, 1899, and recorded in Wyoming County clerk's office in Book No. 124 of Deeds at page 412, on the 17th day of April, 1899."

CASTILE SALT CO.

In 1884 the Castile Salt Company began operations near the village of Castile in the eastern part of the county. Two wells were sunk and a small pan block was erected with a capacity of 150 barrels per day:

Record of the first well:

Soil	49	feet
Argillaceous sandstone	175	or
Blue shale nearly uniform in color and hardness	786	"
Flint shell (?)	10	"
Building stone nearly like the first.....	650	"
Black shale nearly like coal, lower part much darker than upper	100	"
Corniferous limestone	140	"
Alternate layers of hard and soft rock, two-thirds of which was hard as flint and the rest shale	320	"
Soft slate saturated with brine	100	"
Salt and slate mixed, some salt crystals...	35	"
Clear salt	45	"
Slate	40	"
Salt and slate, five feet of which was salt.	70	"
	2,525	"

The drill was stopped while yet in salt, the owners believing that they had enough for their purpose.

It is believed that this company suspended operations prior to 1899.

PERRY SALT CO.

During 1887 the plant of the above company was erected at the village of Perry, near the outlet of Silver Lake in

the eastern part of the county. Fitch Adams, who put down the wells for the Pearl Salt Co. at Pearl Creek, sank the wells for the Perry Salt Co. Col. James O. McClure designed and constructed the plant. The following clipping from an issue of the "Warsaw Times" of that period will give the reader some idea of the work which was done:

"Col. James O. McClure has just completed a set of fine building plans for the Perry Salt Company. They are beautiful in design, and appear just the thing desired for a model salt plant. The total length of the building is 352 feet, by 135 feet in width. Over 1,500,000 feet of lumber will be used in their construction, and it is the purpose of the company to have a convenient and well built plant. The boiler house will contain nine boilers of 100 horse-power each and the brine capacity of the works is over 1,000,000 gallons. It is expected that the works will be put under contract immediately, and the buildings be rapidly pushed forward to completion."

The grainer system was used and the capacity was 500 barrels daily.

The name was later changed to the Silver Lake Salt Co., and as such the concern was taken into the National Salt Co. in 1899 and the plant shut down.

A few years later an organization known as the Iroquois Salt Co. was formed for the purpose of building a plant at Silver Lake which would be independent of the National Co. or "trust." Land was purchased and building was commenced when objections were made that the refuse brine would contaminate the waters of the lake. The Iroquois people therefore made overtures to the National Salt Company, looking to the acquisition of the abandoned Silver Lake plant, which was not open to that objection, as it was located further down on the outlet of the lake. The purchase was made and the works improved with a view to beginning the manufacture of salt, which was done in about a year's time. Harry Yates of Buffalo was president of the new company, which continued operations as late as 1905.

THE ELDRIDGE-BRADLEY PLANT

During the early part of 1885 Mr. Daniel Eldridge of Erie, Pa., organized a company known as the Eldridge Salt Co., of which he himself was president. In July of the same year this organization sank its first well between Warsaw and Rock Glen, on the western side of the valley. Record is as follows:

Soil	9 feet
Shale (sandstone ?)	450 "
Slate	856 "
Corniferous limestone	225 "
Flint rock	70 "
Lower Hilderberg	365 "
Salt deposit	54 "
"Pocket"	10 "
<hr/>	
Total depth	2,039 "

A large grainer plant was erected the following year and four additional wells were sunk. The daily output was 600 barrels, which was increased later on.

The company did not prosper in a financial way, however, and the property was sold under foreclosure in March, 1889. The new owners changed the name to the Bradley Salt Co. and operations were again resumed at the plant.

In 1899 the Bradley Salt Co. was among those absorbed by the National Salt Co. and the plant proved to be one of the most important belonging to that company. The plant came into the hands of the International Salt Co. in 1904, when they purchased the properties of the defunct National Salt Co. at Receiver's Sale. The plant is thus described in the circular of the sale:

"THIRTEENTH PARCEL

The plant in the town of Warsaw, Wyoming County, New York, formerly operated by the Bradley Salt Company, about 34 acres of land; five salt wells and mining rights; also office building; mill building for refining; storehouse, capacity ten thousand tons; vacuum pan building, fourteen boilers aggregating about 2,300 h.p.; one settler building, four settlers; blacksmith shop, cooper shop and storehouse; brine tanks, derricks, pipe lines, machinery and tools; also eight dwelling houses situated near the works, water rights and easements, complete fire apparatus. Plant is in continuous operation."

The works were operated by the International for several years and then abandoned.

The following clipping from a newspaper of the period is interesting:

"LAST OF SALT PLANTS TO GO—RELIC OF WARSAW'S ONCE FAMOUS INDUSTRY—BUILDING TO BE DISMANTLED—MACHINERY WILL BE INSTALLED IN OTHER PLACES—ITS DAILY OUTPUT OF SALT WAS 1,000 BARRELS.

Warsaw, Aug. 15.—The Yorkshire plant of Warsaw, belonging to the International Salt Company, is now being dismantled

and its machinery and other equipment taken to other plants of the company where rail and water communication is had, thereby obtaining better rates both for the transportation of salt and coal. This plant is the last of ten plants in existence in this town at the time of their disposal to the National Salt Company in 1899.

The Yorkshire plant was one of the best and most complete works in the country and its daily output of salt was one thousand barrels, ranking every other plant in the State. Its equipment consisted of twelve grainers, two vacuum processes, mill and all the modern appliances known for making the best of salt. Added to this was the purity of the brine used and its strength.

It was built in 1885 by the Eldridge Salt Company of Erie, Pa., afterwards bought by the Bradley Salt Company and by it sold to the National Salt Company for \$350,000.

When the salt manufacture of the Warsaw valley was at its height there were employed one thousand men. Today this force has been dissipated and gone to other parts, which materially lessens the business of this little town.

In 1878, when salt was first found in this valley, it was generally supposed that Warsaw had the monopoly of the salt business, and some of the optimists here predicted a population of over 50,000 persons for the town of Warsaw. But as the drill was sunk in other towns and salt was found it became well known that salt could be found almost everywhere and the chimerical idea of Warsaw becoming a city vanished."

The block was familiarly known as the "Yorkshire" plant, from a brand of salt known as "Yorkshire" which was produced there; which brand is still continued by the International and enjoys a wide sale.

PERMANENT PLANTS

We now come to the history and description of two salt plants that weathered the storm of adversity which fell upon the salt industry of Wyoming County, and have continued operations from the early days up to the present. We refer to the Rock Glen Salt Co., situated at Rock Glen, and the Worcester Salt Co., at Silver Springs, about three miles south of the former. The third plant, that of the Crystal Salt Co., has already been described.

ROCK GLEN SALT CO.

This plant was built during 1885-1886 by Alex. Kerr, Brother & Co., of Philadelphia, an old established firm of salt dealers who are now the owners of the Genesee Salt Co., of Piffard, N. Y., which is described in our chapter on Livingston County.

The plant began operations in the fall of the latter year and was situated near the village of Rock Glen, between the tracks of the Erie and the Buffalo, Rochester & Pittsburgh railroads, and connected with both by private switches. Seven wells were sunk of an average depth of about 2,000 feet, and water for dissolving the salt was obtained from a branch of Oatka Creek which flowed through the property. Salt was made by both the grainer and open pan systems. The company operated two pans, which were built after the plans and specifications of the English method, and these were the only ones in America making salt by the English method at that time. The company made the various grades of salt that were then in the market and also had a large drying plant where the dairy salt was dried and prepared for the trade.

The wells of this company were known as "forcing wells," each well containing two concentric iron tubes, the outer one being some five inches and the inner one about three inches in diameter. The water of the creek was pumped from the reservoir down the outer tube, and having become fully saturated with the saline substance at the bottom, was forced by the pressure from above to return to the surface through the inner tube. The heavy brine was pumped to tanks, where it was exposed to the atmosphere, during which quick lime was put into it for the purpose of ridding it of certain impurities.

The plant was operated by the Kerr firm under the name of the Kerr Salt Co., and their "Acme" brand of fine salt and "Unexcelled" brand of coarse salt enjoyed a wide sale for many years.

In 1899 the plant was purchased by the National Salt Co. Some time before the dissolution of that company in 1904 the plant was sold to the American Electrolytic Co., who conducted operations for a short time. About 1906 the plant was again sold and a new company was organized under the name of the Rock Glen Salt Co., to operate the works, which they have done ever since with uniform success under the able management of Mr. F. W. Relyea. Dr. W. C. Gouinlock, a pioneer salt manufacturer of the neighboring town of Warsaw, is also very largely interested in the company. The present plant consists of two open pans and five grainers.

WORCESTER SALT CO.

We now come to the consideration of the plant of the Worcester Salt Co., one of the best known and most important plants in the State. The works are located at Silver Springs, in the southern part of the county, about ten miles south of Warsaw and five miles south of Rock Glen.

This company does, or did, publish a monthly pamphlet devoted to the interests of Worcester Salt and known as the "Worcester Salt News." In the June, 1912, issue of this periodical there appeared an interesting history and description of the plant written by Mr. J. E. Nash, an official of the company. Owing to the kindness of Mr. Lorenzo Benedict, president of the company, we are allowed to reproduce this article in full, and surely no better record of the plant could be compiled than this interesting account, coming as it does first-hand from one who has always been connected with the enterprise.

"THE SILVER SPRINGS FACTORY

BY J. E. NASH

In writing of the early history of the factory at Silver Springs it would perhaps also be interesting to briefly review the history of the salt industry in this country—the first record of which is contained in a Government report published in 1858. According to this report the first salt works was set up at Cape Charles, on the eastern shores of Virginia, in 1620; but the report does not state what success was attained at this time. During the Revolutionary War it was impossible for the Colonists to obtain salt from England, so they began the manufacture of salt from sea water, by boiling, and at the end of the war an extensive system of salt-making was developed around New Bedford and on Cape Cod. Salt-making from brine other than sea water began in later years. In 1770 salt was made by the Delaware Indians in the vicinity of Syracuse, N. Y., and traded off by them in Albany and as far north as Quebec. The first salt made by white men, except from sea water as on Cape Cod, was made in this same locality in 1788, but it was not until 1797 that the State of New York passed laws regulating the salt industry and establishing the Onondaga Reservation, which was put under control of the State and furnished brine to all who paid for it at the rate of 1 cent for every bushel of salt made. The brine obtained from this reservation, however, was weak, containing only about 18 per cent. of salt, whereas the brine used at Silver Springs contains approximately 25 per cent. of salt. This, of course, is the reason for the failure of the salt business at Syracuse, for as soon as a stronger brine was obtained elsewhere, the Syracuse plants were unable to compete. Prior to 1883 all the salt produced in the State of New York was from the Onondaga Reservation. Now only solar salt is made there.

Salt was struck in the Oatka Valley in Wyoming County, N. Y., accidentally rather than intentionally. About 1878 a well was put down for oil, but instead of oil, salt was found. The

first salt manufactured in this valley was during the year 1883, by the Warsaw Dairy Salt Co.* It was about this time that Mr. J. M. Duncan, who had previously been actively engaged in the salt business in Syracuse, moved to Warsaw and took charge of the plant of the Warsaw company. It was during his occupancy of this position that he conceived and developed the idea of making salt in a vacuum pan. He obtained his patents, but had hard work to interest his associates in the idea, for scientific men at that time said it was impossible to make salt in a closed vessel. For the previous century there had been no great steps in the art of salt-making. All salt was made by boiling in kettles, grainers, or open pans, and the grain produced was practically all of the same character; but Mr. Duncan finally succeeded in interesting enough capital to build a small vacuum pan, although the early trials developed a number of conditions which made the operation of the pan irregular, costly and non-dependable.

It was just previous to this time that the first well was drilled at Silver Springs. A few public-spirited citizens raised enough money to sink a well, and as soon as salt was struck, succeeded in interesting Batavia capitalists, who formed what was then called the Silver Springs Salt Co. At that time the village had a population of only a trifle over 200, and was simply a junction point between the Erie and the B., R. & P. railroads. As soon as the company was formed the erection of the plant began, but it was not until January, 1885, that the first salt was made. Thomas O'Boyle of Silver Springs lifted the salt out of the first grainers operated, and O'Boyle is today one of the many active and dependable employees of our company.

The persons forming the Silver Springs Salt Co. were new in the salt business, and the early days of the plant were far from being financially successful. Owing to this fact and also to the fact that Mr. Duncan had not had the opportunity to develop his vacuum pan at Warsaw, he saw the chance afforded, and buying out the interest of Hough & McIntyre of Batavia, obtained control of the Silver Springs Salt Co., changed its name to the Duncan Salt Co., and in the spring of 1885 moved to Silver Springs and, in company with his nephew, William Morgan, began operations which have been so successful as to be almost astounding. This success was not accomplished, however, without setbacks and an unlimited amount of persistent effort. Money was scarce and it required the most careful management and the greatest possible economy to obtain funds with which to develop his invention. There are still in our employ men who worked for Mr. Duncan at that time, and they tell

* The first salt to be produced in commercial quantities.—C. J. W.

with admiration of the untiring labor and concentrated devotion which Mr. Duncan put into his work. It was not all smooth sailing, and many a night found Mr. Duncan at the plant perfecting details, overcoming obstacles and strengthening weak points in the apparatus which was destined to produce the *finest salt in the world*. His genius and the thoroughness of his work are emphatically demonstrated by the fact that today the same type of pans with very few minor changes in their construction or in their operation, are manufacturing Worcester salt.

The next problem was one of marketing the product, and, strange as it may seem, this proved to be a difficult proposition. The cubical grain of salt was unknown up to that time. Some were afraid that it could not be sold even in place of common salt, and for this reason the first salt made in the vacuum pan was not sold as high grade table salt; and it was not until Mr. Duncan was brought in contact with Messrs. Nash, Whiton & Co. of New York, who were then in the commission business, importing salt, handling fruit, butter, etc., that he met with any success in the way of marketing his product. Nash, Whiton & Co. were then importing salt and marketing it under the name of the Worcester brand, and samples which Mr. Duncan showed them were so satisfactory that it did not take long to arrange terms, and they contracted to handle his entire output. The marvelous developments of the business made extensive additions to the plant necessary almost from the very beginning, for when Mr. Duncan took charge of the plant, the salt-making apparatus consisted only of four grainers and four small boilers. The whole plant at that time could be put in one of our many buildings now. The vacuum pan was installed and developed as fast as possible, and the high quality of the product made business grow very fast. It was not long before the plant had a national reputation, and the name "Worcester" was known from sea to sea.

In the year 1894 the Duncan Salt Co. and Nash, Whiton & Co. consolidated under the name of the Worcester Salt Company, and its history in recent years is well known to all our readers. This splendid achievement must have a reason, and undoubtedly it lies in the fact that the management of the company has always considered quality its paramount aim. This, combined with honest business methods and fair dealing toward their customers, has made for the company an enviable reputation, and the brand Worcester is now recognized as the standard salt of the world. The management of the factory is not only impressed with the necessity for maintaining this present high standard, but also feels that it should never rest content with past or present achievement but continually endeavor to better

the quality of the salt, even if our thousands of customers now claim that quality unsurpassable."

The following statistics of the plant as it is today is also taken from the same issue of the "Worcester Salt News":

"Number of employees, 250.

Floor space, over five acres.

Number of boilers, 22, aggregating 4,000 horse-power, operated by Murphy Automatic stokers. Coal consumption averages 175 tons daily, coal being dumped from cars on trestle into a crusher, thence to an overhead bunker from which it is fed to the furnaces automatically with no labor of handling. Ashes are removed from the pits in buckets by an electric crane, and are loaded in small cars on an industrial railroad on which they are carried away.

The engine room contains, in addition to incidental machinery, the following principal power units:

A 450 h. p. Allis-Chalmers Corliss engine, direct connected to 250 k. w. generator.

A 250 h. p. Cooper Corliss engine connected by rope drive to 150 k. w. General Electric generator.

A 150 h. p. Watts Campbell Corliss engine connected by rope drive to 100 k. w. General Electric generator.

A 175 h. p. Ingersoll-Rand Air Compressor delivering air at 400 pounds pressure.

Four 20 h. p. Cameron Vacuum pumps.

Two 50 h. p. feed pumps, one of which is a centrifugal pump driven by a Terry steam turbine at a speed of 3,000 revolutions per minute.

A Worthington fire pump of 1,000 gallons per minute capacity.

The pump house equipment consists of eight centrifugal pumps direct connected to motors of capacities varying from 20 h. p. to 60 h. p. The aggregate pumping capacity is 9,750 gallons per minute.

The motive power is distributed through the plant by electric transmission, for which purpose there are installed 55 motors aggregating in all over 200 h. p.

The brine is supplied from a stratum of rock salt about 100 feet thick located 2,300 feet below the surface of the ground. The brine is obtained by means of seven wells.

Water is obtained from Wolf Creek, flowing through the property, and also from five fresh water wells 200 feet deep. The amount of fresh water required for salt-making and boiler feed is about 1,000,000 gallons per day, besides which 7,000,000 gallons of cold water have to be supplied to maintain the vacuum in the pans, making a total of over 8,000,000 gallons which have to be pumped during every twenty-four hours.

The plant contains upward of 30 miles of pipe lines.

Number of grainers, 15. Aggregate capacity, 200,000 pounds of salt per day.

The cooper shop is operated by machinery and produces over 325,000 barrels per annum. The barrel loading machines each have a capacity of putting 150 barrels in a car in seventeen minutes.

There are over one and one-third miles of railroad track on the property.

Storage room aggregates capacity for 400 cars of common salt in bulk, and 75 cars of dried salt in barrels.

The Sewing Department is equipped with five filling and sewing machines, each having a capacity of 15,000 pockets per day of nine hours.

The Carton Department is operated by machinery specially designed for the purpose of filling the cartons automatically and has a capacity of over 10,000 cartons per day.

All the foundations of the buildings and the retaining walls have been rebuilt of concrete during the past five years. One of the salt storage houses has also been built entirely of concrete—the only bulk salt storehouse of this material in existence. About 10,000 barrels of cement have been consumed in this work, which is still in progress, it being the policy of the company whenever replacement becomes necessary to make the building fireproof.

Fire protection is afforded by automatic sprinklers throughout the plant, and by ten hydrants placed throughout the property. The company has its own fire department, consisting of companies to man all the hydrant houses and a general ladder crew headed by a fire chief. Each employee has a definite station and as the result of the frequent fire drills a stream of water can be turned on any part of the factory within 40 seconds of the sounding of the alarm.

The operation of the plant is continuous day and night except on July 4th and on Christmas."

Chapter VI.

GENESEE COUNTY

GENESEE COUNTY deservedly takes an important position among the salt producing counties of the State, from the fact that at Le Roy was established a very early attempt to manufacture salt from the extensive rock salt beds which from that day to the present have kept our State in the front rank of the salt producing States of the Union. It is true that the honor of discovering the rock salt beds belongs to another county, namely, Wyoming, but to Genesee is due the honor of erecting the first permanent plant to constantly produce salt from that time up to the present day.

This plant of which I speak is that of the Le Roy Salt Company at Le Roy, and it is today one of the important salt works in the State.

However, before we take up the history of the rock salt beds in this county we will turn our attention to a single instance of salt-making from the natural salt springs and wells by early settlers. We have already seen that in a great many counties salt-making was one of the occupations of the settlers and Genesee County is no exception to the rule.

In the year 1823 there lived in the village of Le Roy two brothers by the name of Charles and Albert Hill. During the year 1823 Charles Hill wrote to his parents living in Connecticut, and it is from this letter that we learn of this isolated instance of early salt-making. The letter is still in existence and is in the possession of Mr. C. J. Hill of Le Roy, the son of the writer. The portion of the letter concerning salt is as follows: "Mr. Graves, near us, has dug a well and bored last fall about fifty feet for salt water, which he has obtained, and when boiled makes good salt. But we believe it not of sufficient saltiness to make a profitable business. Yet it is believed that if he should go to the depth of one hundred feet there would be water found worth boiling, as it increases in strength as he goes deeper."

The next instance of early salt-making was in the township of Elba, about eight miles northwest of Batavia, on land which was owned at that time, about 1835, by John G. Satterlee. This spring arose from the Onondaga salt group, which has given us almost all of the salt deposits of the State. In his "Survey of the Fourth Geological District," published in 1843, Professor James Hall states that it was the most copious and

strongly impregnated saline in the Fourth District, which was composed of the counties of Wayne, Monroe, Orleans, Niagara, Seneca, Ontario, Yates, Livingston, Genesee, Erie, Chemung, Steuben, Allegany, Cattaraugus, Chautauqua and the western part of Tompkins. Of course, this was years before the discovery of the great salt deposits of Genesee, Livingston and Tompkins Counties, and Professor Hall's statement is only applicable to conditions as they were at the time of the publication of his Survey.

When Professor Hall visited this spring about 1840, the water was arising freely in about the same quantity as a common pump could supply, and it was of a very strong saline taste. There were also a few similar springs adjacent to this one, but they were not its equal in strength. Several wells had been sunk near these springs some years before Professor Hall's visit and it was from the wells and not the springs that the salt was made. No salt at all was manufactured there at the time of the visit and nothing has been done since then.

In the case of one of the wells a boring was made to the rock salt and continued for fifty feet further. A wooden tube two inches in diameter was placed in the boring and the brine immediately rose up in it and out over the surface of the land.

We now come to the first permanent use of that great and extensive bed of rock salt which underlies such a large portion of our State and which has in no small degree contributed to the wealth and importance of the Empire State and is today one of the principal industries within our borders.

As a result of the discovery of rock salt at Wyoming in 1878, Mr. C. M. Everest, an official of the Vacuum Oil Company, turned his attention to Le Roy, where surface indications were good and where the advantages of good railroad transportation were apparent. In November, 1878, a contract for the desired amount of land on the Lent farm was obtained on very favorable terms. Through the efforts of N. B. Keeney and others, the citizens of Le Roy were induced to pledge themselves to furnish a bonus of \$1,500 if Mr. Everest on his part should sink a test well to salt or the Niagara limestone.

After some delay the drilling was started on the 4th of December, 1878, and after a great deal of difficulty the well was sunk to a depth of 620 feet, where salt was found. The drilling was continued to 650 feet, at which depth, work was stopped, as no further hope could be held out of finding anything better in the way of salt.

From the Bulletin of the New York State Museum, Vol. 3, No. 11, by F. J. H. Merrill, a geologist, a table of the different geological formations passed through in sinking the first well is here offered.

Le Roy, Genesee County. First Well (Bishop)

Soil, etc.	23	feet
Marcellus shale	10	"
Corniferous limestone	150	"
Water lime (hydraulic limestone)	40	"
Soft rock, saline shales	427	"

The sinking of the well was a great event for Le Roy and people came from long distances to witness the sight of brine and oil flowing alternately from the well. There were many fond dreams of Le Roy becoming a large city at that time. The Le Roy "Gazette" of February 26th, 1879, gives a very graphic account of the well.

"The Vacuum Oil Company, who for the past few months has been drilling with the hope of discovering salt, continued their heroic efforts under many discouragements, yet with zeal complimentary to this company and without the least sign of success until last Friday, the 21st, about noon. They had reached a depth of 450 feet below the surface when, from the cleft rock upon which they were working, gas commenced escaping and continued to increase at an incalculable rate when as if from the bottomless pit, it rushed up and about, filling the atmosphere and, taking the responsibility of the affair, started out to celebrate the occasion independent of orders from other sources. From the well about ten feet distant was a stove. Here the gas took fire and soon enveloped the workshop, with the men, who were so taken by surprise they barely succeeded in saving themselves. With lightning speed the derrick was surrounded by flames, took fire, and only for the next freak of nature it would probably soon have been in ruins. At this critical moment an immense volume of water, impregnated strongly with sulphur, rushed fifty feet into the air, saving the property. Columns of water and waves of gas continued alternately to appear until about 5 o'clock in the afternoon, when brine leaped upward seventy feet in the air and so increased in force that at 7 o'clock it was at the height of 110 feet, the brine being free from sulphur.

"This continued for just twenty-four hours. The brine was boiled and found to contain 30 per cent. of salt. Within a few days the gas was confined to a two-inch pipe, and is now burning night and day, throwing up flame which illuminates the space for a large distance. We learn that Mr. Everest, the owner of the well, will at once take measures to secure this bonanza as a gas well, and in due time proceed to sink another well in pursuit of salt, encouraged thereto by the sure show of salt obtained in this one.

"We learn that a manufacturing company of Rochester has

been here taking notes, and are negotiating to bring their establishment here, using the flow of gas to run their machinery and for lighting the works. Sand found at the bottom of the well is the same as found in the Bradford oil wells, which leads to the hope that oil will reward their enterprise in sinking this Le Roy illuminator and spouter. It is estimated that this flow of gas now going to waste is more than enough to light Le Roy, even when she numbers 30,000 inhabitants, which she hopes to reach in the next five years."

Mr. Henry B. Parsons, at that time chief chemist with the firm of W. H. Schieffelin & Co. of New York City, made a chemical analysis of the brine from this first well, which is as follows:

Analysis of Brine from Well No. 1, Le Roy, N. Y.

Specific gravity of brine at 15° C. (59° F.), 1.205.

Weight per wine gallon (231 cubic in.), at 15° C. (59° F.), 10,038 lbs. av.

Degree of saturation, at 15° C. (59° F.), 98.

CONSTITUENTS—	Percentages in Brine	Weight per Wine Gallon Grains
Insoluble suspended mineral matter, chiefly clay and oxide of iron..		0.69
<i>Substances in Water Solution</i>		
Sulphate of calcium.....	0.153	107.51
Chloride of calcium	0.519	365.33
Chloride of magnesium	0.114	80.25
Chloride of sodium.....	25.810	2 lb. 9 oz.
Undetermined substances and loss..	0.029	16.94
Total soluble solids, dried at 100 to 105° C. (212° to 221° F.).	26.625	331.68

One hundred parts by weight of a saturated solution of salt contain at 15° C. (59° F.) 26,316 parts of salt. Hence, dividing the percentage of salt in this brine (25.81) by 26,625 (the percentage of salt in a saturated solution), 98 gives the saturation.

In concluding his analysis Mr. Parsons stated: "I am sure you have a very valuable brine. I know of none that equals it in this country, and with cheap fuel and convenient apparatus, it seems to me that you can make salt cheaper than any other competitors yet in the field. The nearly complete saturation of this brine and its small percentage of impurities will render it both easy and economical to work. The amount of evaporation will be slight, the use of lime or other purifying agents unnecessary and the product first class in every respect."

From a practical standpoint, however, this well did not prove satisfactory and the original subscribers to the bonus fund, together with Mr. Everest, started a second well. The drill was started on Friday, November 18th, 1881, and after passing through various geological formations, brine, together with a salt vein of 20 to 25 feet thickness, was found at a depth of 615 feet.

We are again indebted to the Bulletin of the State Museum, by Dr. Merrill, for a geological table of the second well, which is as follows:

Le Roy, Genesee County—Second Well (Bishop).

Soil, etc.	22	feet
Marcellus shale	11	"
Corniferous limestone	137	"
Water lime, hydraulic limestone, soft rock, sa-		
line shales	440	"
	<hr/>	
	610	"

From a comparison of this table with that of the first well it will be seen that the widths of the different geological formations are very much the same, except that in the case of the second well the salt was struck 40 feet higher than in the first well.

After the sinking of the second well Mr. Everest decided to give up his interests in the salt wells, as other business affairs called him elsewhere, and Messrs. C. F. Prentice, S. C. Wells, A. E. Miller and N. B. Keeney, all of whom had been included in the first subscription, bought Mr. Everest's interest in the wells in February, 1882.

During the spring of 1883 the American Chemical Company, of West Bay City, Michigan, erected a small plant with an output of 100 barrels per day, and the first salt was made and shipped in September of that year. The processes employed by the above named company proved a failure; the works were remodeled during May and June of 1884 and the grainer process installed. The failure of the American Chemical Company about this time did not, however, end the salt industry in Le Roy. On the contrary, the four gentlemen who had bought out Mr. Everest's interests in the first two salt wells went ahead with their plans and decided that the future of the salt business at Le Roy warranted an increase of capital sufficient to enter upon the manufacture of salt on an enlarged scale. Consequently another well was sunk, this time at the junction of the D., L. & W. and B., R. & P. railroads, on the Gilmore farm, three miles south of Le Roy. A very interesting account of this well is given by

the Le Roy "Gazette" in its issue of September 4th, 1884, which is as follows:

"SALT—MORE SALT—51 FEET SOLID ROCK SALT FOUND IN
LE ROY

"The citizens of Le Roy were greatly pleased to learn on Thursday morning that very gratifying results had been developed on the preceding evening at the Le Roy Salt Company's well at the D., L. & W. junction, where drilling has been going on for a short time past. At a depth of 840 feet, the drill entered a layer of solid salt, which was found to be of a thickness of fifty-one feet. The salt is nearer the surface than in any well in the vicinity, and is consequently of much more value. This difference is said to be fifty feet, while it exceeds many by several hundreds. Rejoicing is great in Le Roy, for it is thus proven that the town has solid salt as well as brine, thus removing the objections that have been brought against it on account of the supposed absence of the former. The result of this well will undoubtedly lead to the sinking of others which have been somewhat delayed in order to see the outcome of the drilling. Nothing now stands in the way of Le Roy attaining as much celebrity as a salt field as any of the places now in competition, for it affords unsurpassed locations for all inclined towards developing the salt industry in this part of the State. The oft-mentioned shipping facilities are veritable and brook no contradiction. The people of Le Roy were always satisfied with the brine found, but they are undoubtedly pleased to see all objections to the field fade away as if by magic."

From the Bulletin of the New York State Museum, by Mr. Merrill, we give a table of the geological formations passed through in sinking this well.

Junction of the B. & P. with the D., L. & W. R. R., Genesee County (Bishop)

Gravel	46	feet
Shale	192	"
Corniferous limestone	146	"
Lower Helderburg limestone	454	"
Pure salt (41)	40	"
	878	"

The results here were so gratifying that it was determined to start a permanent business at Le Roy, where the railroads offered unusual facilities for shipment. In the fall of 1884 the before mentioned gentlemen organized the Le Roy Salt Company with a capitalization of \$100,000 divided into 1,000 shares

of \$100 each. Mr. A. E. Miller was chosen as superintendent of the works. Two grainers and four boilers were installed and during the fall of 1884; 14,000 barrels of salt were shipped, with the aid of fourteen workmen.

The first officers were: C. F. Prentice, president; S. C. Wells, vice-president; A. E. Miller, treasurer, and C. N. Keeney, secretary.

The salt was produced by the grainer system and evaporated by steam. The capacity of the works about 1886 was about 500 barrels per day. In January, 1889, Mr. S. C. Wells disposed of his interest in the company, which was purchased by the other stockholders.

In 1890 the daily production had risen to 600 barrels and a force of 70 men were employed. Ten boilers of 80 horse-power each supplied the steam for evaporating the product and also the motive power. Eleven grainers were employed and the storage capacity of the warehouse was over 100,000 bushels.

The main building was 136 by 300 feet and there was also an addition 40 by 136 feet. Eight wells supplied the brine.

A table of production is here given which will show graphically the growth of the plant from 1883 to 1898. The figures from 1891 to 1894 inclusive are not available.

1883	17	tons
1884	199	"
1885	7,901	"
1886	13,715	"
1887	13,783	"
1888	17,283	"
1889	18,552	"
1890 (ten months)	17,201	"
1895	35,803	"
1896	38,016	"
1897	40,129	"
1898	32,029	"

On August 31, 1890, the plant was partially destroyed by fire, but the damage to the buildings was immediately repaired.

It may perhaps be fitting to give at this point a short description of the grainer process of making salt, which has been used by the Le Roy Salt Company from its inception up to the present day. It is contained in Vol. 3, No. 11 of the Bulletins of the New York State Museum, by Frederick J. H. Merrill, Ph. D., Assistant State Geologist, the article itself on the grainer process being written by Dr. F. E. Englehardt, which we append here in full:

"THE GRAINER PROCESS"

"The grainer or Michigan process is, like the 'kettle method,' a purely American invention and consists in passing live or exhaust steam through a set of iron pipes immersed in long, shallow wooden or iron vats. These vats rest on a strong wooden wide, and from 20 to 24 inches deep; provided with 4 to 6 steam pipes having a diameter of 4 to 5 inches, and hung on pendants 4 to 6 inches above the bottom of the vats. These pipes are within a few feet of the same length as the grainer, and so arranged that the salt can be conveniently removed toward the outer side of the grainer. Over the top of the grainer is a strong platform to receive the salt taken from it for proper drainage; this also supports the pendants holding the steam pipes in their position. In most of the grainer blocks the salt is removed from the grainers by attendants called 'lifters.' In others an ingenious device called a 'raker' does this work, automatically moving the salt constantly from the front end of the grainer to the back, where it drops into properly constructed 'conveyors' which deposit it in the salt bins. Where no rakers are employed, the salt is removed every twenty-four hours. The brine, which is 'settled' in exactly the same manner as that treated by the kettle and pan methods, is allowed to run into the grainers at the front end in the same proportion as the water evaporates from the brine. The only attention required, when the salt is not 'lifted,' is to pay proper attention to the supply of brine and the regulation of the steam. This is all attended to by one man. In most work soft coal is used as a fuel under the boilers, that and the expense for the fireman being a considerable item in the grainer plant. To obtain the best effect in a grainer system, the temperature of the heated brine should be kept at or near the boiling point when no lifting or removal of salt is in progress. To do this we must first supply to the grainers an abundance of high-pressure steam, and secondly the constant supply of brine required for the grainers while evaporation is going on must enter at a temperature but little lower than that of the brine in the grainer. For this purpose two large tanks, so-called settlers, are employed, which are usually as long and wide as the grainers but six feet deep and provided with four rows of steam pipes, about one foot above the floor, to heat the cold brine drawn into them from the outside cisterns as required. Although the six rows of steam pipes in the grainer have an entire length of from 550 to 750 feet (suspended in the brine 4 to 6 inches above the bottom of the grainer and with 8 to 10 inches of brine above them) and a heating surface of from 700 to 1,000 square feet,

a great deal of the steam supplied to them is not condensed, and therefore passes from the grainer pipes into the settler pipes (sometimes passing through a steam trap to separate the condensed water) to heat the brine of the settlers. Whenever there is a surplus of steam, for instance while the lifting of the salt from the grainers is going on, the direct steam is used for the same purpose. To produce the best quality of salt the pickle in the grainers must not become overcharged with calcium and magnesium chlorides, which can only be done by removing from time to time the inferior pickle. Since this pickle contains from 18 to 20 per cent. of salt, too valuable to go to waste, it is discharged into a set of grainers on the ground floor of the building, called lower or divided grainers. They are placed either directly under the upper grainers, in which case they are but eight feet wide with four steam pipes, or in some other convenient place. The pickle is heated in them by uncondensed steam and condensed water coming from the steam pipes in the settlers and upper grainers. The product of these lower or divided grainers in consequence of the low temperature at which the salt is made in them, is very coarse, often having an inferior color. The salt is removed from them at longer intervals—every six or ten days, according to circumstances—and the remaining pickle is discharged as useless. The removal of the salt into the bins, etc., does not differ in any essential from what has been stated in regard to the other methods."

Upon formation of the National Salt Company in March, 1899, the Le Roy Salt Company was bought up by this corporation, together with many other evaporation and mineral plants in the State. The exact sale of the Le Roy plant to the National Salt Company was April 1st, 1899.

On May 9th, 1901, the National Salt Company sold the plant to the Empire State Salt Company, a corporation formed to take over the plant. From this date until 1905 the property was known under the name of the Empire State Salt Company.

In February, 1905, the Empire State Salt Company was reorganized and incorporated under the name of the Le Roy Salt Company, the old name under which it had been started. The capital stock amounted to \$100,000 and the directors were as follows: Jacob C. Dold, Fred Klinck, Nathan Wolf and Isaac Weil of Buffalo, and C. F. Prentice, J. P. Samson and J. S. Carr of Le Roy. Of these, Mr. C. F. Prentice was the only one of the original directors of the original Le Roy Salt Company to be included in this reorganization.

The object of incorporating again was for the purpose of changing the name of the company from the Empire State Salt Company to its original name, the Le Roy Salt Company, which

has been maintained up to the present day. The old name is more desirable since it embodies the name of Le Roy, to which the plant is justly entitled.

This plant is one of Le Roy's most flourishing industries and has always been operated to about its full capacity while many other salt plants of Western New York have been closed down. Much of this success is undoubtedly due to Mr. J. P. Samson, who was appointed general manager of the company on the death of Mr. Augustus E. Miller, the first treasurer and general manager, who died August 28th, 1891. From that day to the present Mr. Samson has continued in his position of general manager, and to his supervision and guidance the increased and continued prosperity of the company is in large measure due. Since the present company has taken hold of the property, many improvements have been made and the capacity of the plant largely increased, and at the present time the Le Roy Salt Company may be ranked among the important salt plants of the entire country.

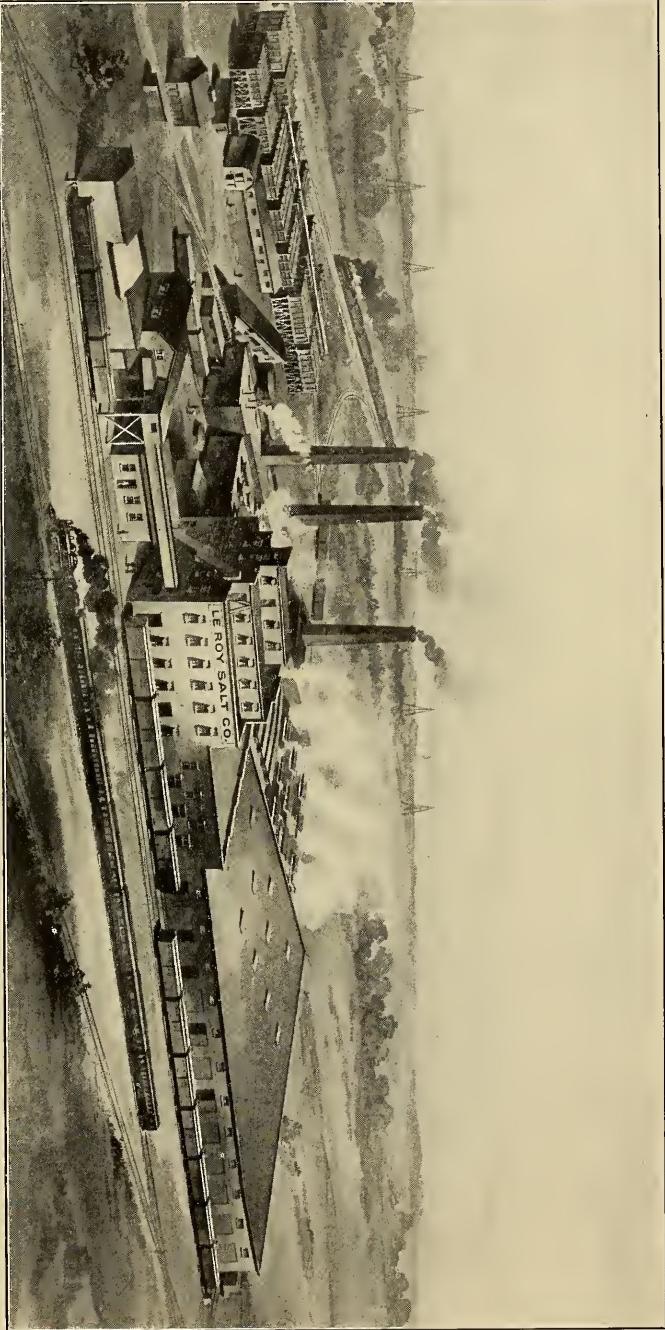
Besides the advantages enjoyed from efficient management, the Le Roy Salt Company has the added advantage of being situated on the following railroads: Erie; Buffalo, Rochester & Pittsburgh; New York Central; Lehigh Valley, and Delaware, Lackawanna & Western. This circumstance assures to them plenty of cars at all times and competition freight rates.

The Le Roy Salt Company manufacture all grades of evaporated salt, their brands being as follows:

All of their regular grades of salt are put out under the "Le Roy" brand, and it may be fitting to state here that the salt produced by this company has always held the highest reputation for purity and quality. Their butter and cheese salt, of which they have always made a specialty, is put out under the "Premium" brand. A grade of specially prepared salt for salt shakers is their "Carr's Ready Shake" brand, packed in damp-proof cartons with a pouring device. This is the very highest type of salt in the most modern package for the highest class of family trade. It is named after Mr. J. S. Carr, the sales manager of the company, who originated the article.

An analysis of a sample of Le Roy salt was made by Dr. Englehardt of Syracuse, N. Y., with the following highly creditable result:

Moisture	0.12716
Insoluble matter	0.00860
Sulphate of lime	0.84555
Chloride of calcium	0.05636
Pure salt	98.92145



LE ROY SALT COMPANY

Le Roy, Genesee County, N. Y.

On the morning of March 17th, 1915, the refinery used to make the finer grades of salt was destroyed by fire. The office building and that part of the plant devoted to the manufacture of coarse salt fortunately escaped, and business, although greatly hampered, was carried on as usual, except that no fine salt was made.

The refinery was immediately rebuilt, however, and the new plant is a credit to the industry and business ability of the officers of the company.

PAVILION SALT COMPANY

During 1891 at the village of Pavilion, in the township of the same name, a salt plant was erected by the Pavilion Salt Co., a partnership consisting of L. H. Humphrey, F. J. Humphrey and M. E. Calkins, all of Warsaw, N. Y., at the time of organization. Later, E. H. Buckland was taken into partnership and continued until 1897, when his interest was bought by O. S. Humphrey, also of Warsaw.

The partnership was organized during May, 1891, and the first well was finished July 6th, 1891. The well was sunk to a depth of 1,075 feet and the following geological formations were passed through, the salt bed being 64 feet in width:

Soil	51	feet
Shale, Hamilton	374	"
Corniferous	150	"
Lower Helderberg limestone	374	"
Shale	50	"
Salt bed	64	"
Shale	12	"
<hr/>		
	1,075	

The above record was furnished by Mr. Calkins, who is now president and general manager of the Cayuga Lake Cement Company, at Ithaca, N. Y.

A second well was also sunk, and we give below the record of this well taken from the New York State Museum Bulletin No. 11, by F. J. H. Merrill.

Soil	50	feet
Soft limestone	375	"
Corniferous	150	"
Soft limestone	375	"
Shale	50	"
Salt and shale mixed	19	"
Salt mixed with some shale	100	"
<hr/>		
	1,119	"

The plant was situated on the Buffalo, Rochester & Pittsburgh Railroad, about five miles south of the junction of the above named road with the Delaware, Lackawanna & Western Railroad, at which point a well was sunk by the Le Roy Salt Co. in 1884.

The works and buildings for the manufacture of the salt were in process of erection during the summer of 1891 and were completed the latter part of the same year.. Full operation was begun in the early part of 1892.

Three direct-heat open pans and two exhaust-steam grainers were used in evaporating the brine. A very good description of the open pan system is given by Dr. F. E. Englehardt in his article on "The Manufacture of Salt in the State of New York," contained in Vol. 3, No. 11 of the Bulletin of State Museum, which we give below. We have already described the grainer process under the heading of "The Le Roy Salt Co." Dr. Englehardt's description is as follows:

"Usually several pans are placed under one roof. They are constructed of large wrought-iron plates riveted together. The thickness of the plates is from one-quarter to three-eights inch. The usual dimensions are: width, 20 to 24 feet, length 100 feet in two sections, and depth 12 inches. The front section is 70 feet and the back one 30 feet long, separated by a loose-fitting wooden or iron partition, to allow the brine from the back section gradually to enter the front one. Adjoining the front pan is a back pan 30 feet long by 20 to 24 feet wide and 12 inches deep. The walls under this pan are from 12 to 16 inches higher to enable the easy transfer of the brine by syphon from the back to the front pan. The ends of these pans are at right angles to the bottom, while the sides are oblique. The front pan is usually supported by two central and two outside walls (though there are some pans differently supported and constructed), which are three feet wide at their base and grates, tapering to one foot in width under the pan bottom. The distance from the top of the grate to the bottom of the pan is between 6 to 8 feet. The grates are 3 to 4 feet wide by 5 to 6 feet long. The walls are built in the most substantial manner and lined on the inside with fire-brick in the front portion and with ordinary bricks farther back, where the heat is less intense. To protect the pan bottom against a too intense heat directly over the fires, a fire-brick arch is built, the crown of which is between 2 and 3 feet below the pan bottom. This arch is solid from the front wall to about 2 feet beyond the grates, where an open space of 6 to 8 inches wide is followed by a second arch from 12 to 16 inches wide, and this again, after an interval, by a third arch only a foot wide, and so on. These arches are called rings and their width decreases from the front of the pan toward the end while

the air spaces increase in width in the same direction. Beyond 20 feet from the front of the first section of the pan they cease altogether. To convey the heat as close to the pan bottom as possible, beyond the last arch, the flues are usually filled in with earth or plaster and thus the distance between the pan and flue bottom is between 3 and 4 feet, or even less, at the end of the first pan, where a perpendicular wall, a so-called bridge wall, reduces the space to about 1½ to 2 feet, through which the products of combustion pass under the back pan and finally into a common chimney.

"For the purpose of draining the salt, before it is conveyed to the storehouse, an inclined wooden platform, the so-called 'drip,' is constructed along the entire length of both pans on either side, resting on the inclined iron sides of the pan.

"The so-called settling of the brine is the same as in the kettle method, with this difference, that the settled brine, in consequence of the greater number of cisterns and their greater capacity, remains for four to five days undisturbed. If it is the intention of the manufacturer to make the so-called 'factory filled salt' used for the dairy and the table, the settling with caustic lime is followed by a second settling with a certain quantity of carbonate of soda, or soda ash, as it is usually called by the workmen. The sodium carbonate is dissolved in salt water and the solution mixed with the brine. The carbonic acid unites with any caustic lime in solution in the brine, while the resultant caustic soda together with the greater quantity of undecomposed sodium carbonate, decomposes the calcium and magnesium chlorides, forming calcium and magnesium carbonates and common salt. Between the settling with lime and sodium carbonate twelve hours are usually allowed to intervene.

"After the pans are properly cleansed they are whitewashed with a thin milk of lime to prevent their rusting until they become thoroughly heated; the fires are started and the pans are filled by siphons to a depth of about six inches with brine from the back pans. The former are so inserted that a constant flow of brine passes from the back pans into the last section of the front pans and from these under the partition into the first section. Into the back pan flows a constant stream from the outside cistern until the front pans are sufficiently full, when the flow is stopped. After a sufficient amount of salt has collected in the first section of front pan, it is removed to the 'drip' for drainage. This is called drawing or raking the pans. The front pans are refilled from the back pan, in which the brine has become considerably heated, and thus is prevented a too rapid cooling of the brine in the front pan, which would seriously interfere with the formation of a properly grained salt. For the same reason the partition is placed in the front pan,

since it prevents any cold brine from coming suddenly into the first section, it being compelled to enter at the bottom of the pan where its temperature is the highest. The first drawing or 'drip' usually contains traces of caustic lime in consequence of the white-washing of the pans, and since this would be detrimental to butter, cheese, provisions, etc., salted with it, it is always kept separate and sent into the market as 'agricultural' salt.

"The great advantage of the pan process over any other is mainly in the controlling of the grain. According to the object of the manufacturer, the salt can be made of any desired grain in a pan. When a fine-grained salt is desired, the fires are increased so that the brine in the first section boils over its entire surface. To aid in the formation of a fine-grained salt (very desirable for dairy and table use), some artificial means are employed. Butter, specially prepared soft (of course made of the best lard or tallow and alkali) gelatine and white glue are some of the substances added, and the quantities used are so insignificant in proportion to the amount of salt that they could not be detected even if they remained, but the hard soap, the lime soap, floats on the brine and is very carefully skimmed off. When this kind of salt is made the pans are 'drawn' every 45 or 60 minutes. In the manufacture of coarser grained salt the 'drawing' of the pans takes place at intervals of two, three, four, five, six or twelve hours, according to the size of the grain, and the temperature of the brine is reduced from 229° F. to 200°, or even 148° F. The storage room for the salt is usually in a separate building.

"The amount of salt and its quality depends on the same conditions given under the kettle method. With good average coal dust and fair weather, 80 to 90 bushels of salt per ton can be made in a well-constructed pan during the summer season from saturated brine, which quantity will be reduced to 68 bushels during the winter months. A good average proportion for the entire year is about one ton to 72 bushels per ton with brine 'up to saturation.' The pan salt is always lighter than the kettle salt, bulk for bulk, since a pan never boils as rapidly as a kettle. Consequently the calcium sulphate in the former is very rarely deprived of its water of crystallization, and therefore the pan salt will usually dissolve perfectly clear in water."

From the beginning of operations in 1892 up to 1899 salt was continuously made at the plant, and a good business was done by the company.

The plant was finally sold to the National Salt Company when that corporation bought up so many of the plants throughout the State in 1899. As a result of the sale the partnership was dissolved and the Pavilion Salt Company ceased to exist. Soon afterwards the production of salt at this plant was stopped

and the buildings entirely demolished. Nothing now marks the spot but a pile of scale.

THE LEHIGH SALT MINE

Besides the evaporating plants of the Le Roy Salt Co. and the Pavilion Salt Co., Genesee County contained a mineral plant or mine which existed for a few years but was finally abandoned and torn down.

This mine, together with its contemporary, the Livonia mine, in Livingston County, was the second salt mine to be put down in New York State; the first being the Retsof mine, in Livingston County, which was started in September, 1884.

During the month of August, 1890, Mr. E. L. Fuller, a prominent capitalist of Scranton, came to Le Roy on business connected with a shipment of coal by the Newton Coal Mining Co. of Pittston, Pa., of which company he was secretary.

It might be well to mention here that this was the first entrance into the salt industry of Mr. Fuller, who afterwards became president of the International Salt Company, the largest producers of evaporated and mineral salt not only in our State, but in the entire United States. Mr. Fuller by his ability and forcefulness was during his lifetime the dominant figure in the salt industry of this country. While Mr. Fuller was at Le Roy he became acquainted with General C. F. Bissell, Mr. D. J. Bissell and Mr. Emory Elmore. These three gentlemen took up with Mr. Fuller the subject of a salt mine at Le Roy, and after some talk Mr. Fuller became convinced of the merit of the proposition and agreed to furnish the capital for the undertaking. As a result of this conclusion Mr. Fuller gave orders to Mr. D. J. Bissell to secure options on all the territory needed for the undertaking. This was done and the following parcels of land were purchased, owners being:

Cyrus S. Shepard.....	62 acres
C. C. Davis	82 "
C. S. Simons	10 "
J. L. Kinney.....	111 "
R. L. Hutchinson.....	160 "

Adjoining this property and in addition to it, mineral rights were secured on 3,000 acres, securing therefore to the company rights on a total of 3,425 acres.

Upon the purchase of this land, the company was organized and took the name of the Lehigh Salt Mining Company, with a capitalization of \$1,500,000.

Work was started during May, 1891, on two shafts, each 12 x 24 feet in width, which were excavated to a depth of 800

feet. At about the same time the Livonia mine was started in Livingston County, their shaft being started on September 15, 1890, and completed August 13, 1892. Although the Livonia shaft was started eight months ahead of the Lehigh shaft, both were finished in the fall of 1892, and to all intents and purposes were contemporaneous. Two shafts are required by law, so that if one shaft is blocked by an accident, fire or cave-in, an exit to the surface may be obtained through the second shaft and "head house" directly over the two shafts. The usual shaft house was constructed; the height of the building being 150 feet. The boiler and engine houses were of brick and stone. Besides these structures the company erected a frame building which was used as a general store for their employees to do their trading in. Office buildings were also erected, as were homes for the miners and other employees. A description of the mine is given in the Le Roy "Gazette" for December 14, 1892. This is, of course, a contemporary account of the mine and shows very well the enthusiasm shown by the Le Royans for the new industry in their midst. The account is as follows:

"While in Le Roy a couple of days last week we took occasion to visit the Lehigh salt mine, on the invitation of its attorney and large stockholder, D. J. Bissell. After a thorough visit through them and a careful examination of the costly machinery, under the management of Superintendent Joyce, a most jovial and entertaining gentleman, who has entire charge of all surface operations, we were taken in charge by Superintendent Conway, who has the entire management of all underground work, conducted to a large elevator, and in seventeen seconds we were 800 feet underground and right in the midst of the greatest salt vein the world has known. The company owns 450 acres and has the mineral right to 3,500 more, and from tests made there is no doubt that the whole is underlaid by an immense deposit of salt. Tunnels have been driven east, west, north and south, and nothing but salt. A railroad track is laid each way, cars loaded and drawn by mules (of which there are quite a number down in the mine) to the elevator and hoisted to the surface—or rather to the 'breakers.' Dynamite is used in blasting, and oftentimes one blast brings down tons of the mineral, which has only to be hoisted to the surface, run through the 'breakers,' and it is ready for the market. And yet with its immense resources the company is unable to supply the demand. They employ 250 operatives, and there is plenty of work for idle hands to do. The company has just put in an expensive and latest improved electric plant, and the whole of the grounds, above and below, will be lighted by electricity. To one who has never visited a mine of this kind it is a sight long to be remembered—salt over you, under you, and all around

you, sparkling like diamonds. To Superintendents Joyce and Conway and Attorney Bissell we extend our thanks for courtesies shown."

From the Bulletin of the New York State Museum, Vol. 3, No. 11, by F. J. H. Merrill, Assistant State Geologist, we are indebted for the following description of the different geological formations passed through in sinking the shaft:

Soil	50 feet
Shale	100 "
Corniferous limestone with flint.....	150 "
Hydraulic limestone	30 "
Cement stone	20 "
Gypsum	100 "
Gypsum, shale and limestone in layers four inches to six inches thick.....	250 "
Salt and shale	75 "
Rock salt	30 "
	—
	805 "

From 1892 until the fall of 1894 the mine was in active operation and shipped large quantities of salt. During the fall of 1894 the plant was shut down, and in 1894 the entire property was sold to the Retsof Mining Company, who owned and operated the first mine in New York State, at Retsof, Livingston County. The large machinery and, in fact, everything movable was transported to the Retsof mine, leaving the gaunt and empty buildings a mute reminder of busier days.

Nothing of note happened to the property until 1903, when a project was set on foot to pump out the water which had accumulated in the mine since its abandonment and work a vein of gypsum which had been uncovered during the process of sinking the shaft. It was proposed to mine this gypsum and use it in the manufacture of plaster of paris and other products which are made from it. However, very little was ever done along this line and the project was soon given up.

During the latter months of 1904 and the first part of 1905 it was decided to tear down the buildings and completely demolish everything connected with the mine. The contract was let to Mr. Charles Morgan of Pavilion and such parts of the buildings as could be utilized were taken to the Retsof and other plants. This ends the history of the Lehigh mine and of the mining of salt in Genesee County.

WELL AT BATAVIA AND SPRINGS AT BETHANY

In addition to the plants already described, a solitary well was sunk at Batavia, the county seat. No salt was ever made

from this well, nor were there any works erected. A table of the geological formations met with in sinking this well is given below. The table is taken from the Bulletin of the New York State Museum, Vol. 3, No. 11, by Dr. Merrill.

Batavia, Genesee County (Prosser)

Drift	40 feet
Marcellus shale	60 "
Helderberg	150 "
Salina group	500 "
Fifteen inches salt 600 feet below surface..	600 "
Niagara	250 "
Medina	1,000 "

The small quantity of salt met with in sinking this well was probably the reason why no salt was ever made there.

At several places in the town of Bethany weak brine springs have been found arising from the soft shales of the Hamilton group. No salt has ever been made from these springs. The town of Bethany is about nine miles southwest from Le Roy, six miles almost due south of Batavia and six miles due west from Pavilion.





HEAD HOUSE, RETSOF MINE
Retsof, Livingston County, N.Y.

Chapter VII.

LIVINGSTON COUNTY.

LIVINGSTON COUNTY was created from Genesee and Ontario Counties on February 23, 1821. A portion of Alleghany County was annexed in 1846 and another portion in 1856. The county is bounded on the north by Monroe, easterly by Ontario, south by Steuben and Alleghany, and west by Wyoming and Genesee.

Of the five salt mines which have been put down in New York State, four have been included within the boundaries of this county, giving it therefore an enviable position in salt annals, and a pre-eminent one in salt mining.

THE RETSOF MINE

Ever since the pioneer salt well of the State was sunk in Wyoming County in 1878, it was believed that salt might be found in the adjoining county of Livingston. Mr. Carroll Cocher, of Greigsville, was among those who held this belief, and after a study of the geological formations north of his native village, predicted that salt could be found there at about 1000 feet from the surface. Mr. C. Q. Freeman, the representative of some New York capitalists, acted upon this prediction, and sank a number of test wells in the vicinity of Greigsville, in order to ascertain the most favorable location to put down a shaft. A location on the farm of Joseph D. Lewis was finally selected and a shaft twelve by eighteen feet was started on September 21, 1884, on the sight of an old stone quarry.

The work of sinking the shaft was vigorously pushed, with three gangs of men working day and night in shifts of eight hours each, until September 10, 1885, when salt was found at a depth of 995 feet.

To Mr. Cocher must be given the credit for the discovery of salt in Livingston County, and for the first salt mine in our State. In spite of contradiction on the part of State geologists, he held to his belief and after much effort, finally induced the capitalists to start operations. Sad to say, he was not rewarded in the slightest degree for his discovery, nor did he ever receive any benefit from the great industry of salt mining in this State, which he was instrumental in starting. He was a poor man and therefore had no money to invest in the enterprise. A few days before his death he was heard to remark that the gift of two cigars from a generous

member of the first company was the only reward he ever obtained for his important discovery.

The first company to operate the mine was known as the Empire Salt Co., with a capital stock of \$600,000, in shares of \$100 each. The officers were William Foster, President; C. Q. Freeman, Vice-President; and R. S. Walker, Secretary and Treasurer. The name of the company was soon after changed to the Retsof Mining Co., the name of Retsof being Mr. Foster's name spelled backward. As time went on, mined salt began to be known as "Retsof Salt," and even today many people in the trade call it by this name. In order to have a sufficient territory for future working, the company leased between 600 and 700 acres of land in the vicinity of the shaft.

We append herewith the geological record of the Retsof salt shaft. This data was obtained from William S. Potter, Supt. of the mine, and Mr. S. Gray, sometime between 1885 and 1891, by Mr. I. P. Bishop, connected with the New York State Museum at that time.

Material	Feet
Shale	133
Limestone	8
Shale	232
Limestone	4
Shale	23
Limestone	2
Black Shale with some Oil.....	1
Corniferous Limestone	142
Cement	13
Dark Sandstone	4
Black and White Cement.....	7
Sandstone	14
Gypsum	4
Cement	26
Gypsum	47
Magnesium, Limestone and Sandstone.....	63
Cement	14
Blue Magnesian Limestone	25
Cement	10
Blue Magnesian Limestone	12
Cement	17
Lime, Cement and Sand	31
Cement	10
Lime and Cement	15
Cement	6
Blue (Shale?)	18
Red (Shale?)	10

Blue (Shale?)	44
Red (Shale?)	5
Blue (Shale?)	13
Limestone	12
Salt and Shale	33
First Salt Bed	20
Limestone and Shale	26
Second Salt Bed	4
Rock	2
Salt	58

At the start of operations the works had a capacity of 6000 tons per day. Only about 400 tons daily were actually mined however.

A huge headhouse and breaker was erected to a height of 130 feet above the shaft and complete machinery for operating a salt mine was installed. The system used in mining salt is similar to that used in mining anthracite coal. Two shafts are sunk, one the working shaft and the other to be used in case the working shaft is blocked by accident or other cause. One million dollars was expended to accomplish the complete construction of the mine and buildings, and it took about two years to finish the work. At the bottom of the shaft a main gangway or tunnel was constructed from which about twenty-five chambers were built at right angles to the main tunnel. These chambers are about 30 rods in length and almost as high and wide as the main tunnel.

A village has sprung up around the mine, which is known as Retsof.

In 1894 the Retsof Mining Co. obtained control of the Lehigh Mine in Genesee County, and much of the machinery was moved to Retsof.

The Retsof Mining Co. is now owned by the International Salt Co., and is probably the largest producer of mineral salt in this country. It was the first mine put down in New York State, and it will always be noteworthy on account of that fact.

THE LIVONIA MINE

The Livonia and Greigsville mines were started almost at the same time, but as the Livonia Co. was organized slightly before the Greigsville enterprise, we will describe it first.

Immediately after rock salt was discovered in Wyoming County in 1878, attention was turned towards the adjoining county of Livingston, on the east, and several wells were sunk which proved that the salt deposits extended to that county. In 1883 the Livingston Salt Co. erected an evaporating plant

at Piffard, and as we have related, the Retsof mine was put down in 1884. Also, wells were sunk at Lakeville.

These developments attracted the attention of Mr. Martin L. Townsend, a New York lawyer with a summer home at South Livonia. His investigations led him to the conclusion that salt might be found on the high land between Conesus Lake and the valley of Hemlock Lake. Therefore, in 1885 Mr. Townsend sank a test well one-half mile north of Livonia Station and about two miles southeast of the Lakeville wells. Salt of a thickness of $32\frac{1}{2}$ feet was found at 1189 feet, which proved that Mr. Townsend was correct in his supposition. The geological formation at this well was not conducive to mining operations, however, and in 1888 Mr. Townsend tried again, two miles south of the first well, on land owned by Mr. J. C. Reed.

This well showed up a more favorable location for a mine, and in June, 1889, the Livonia Salt and Mining Co. was organized. The company was capitalized at \$1,500,000, and the following officers were chosen: Milo M. Belding, President; Martin L. Townsend, Vice-President; Milo M. Belding, Jr., Secretary; William B. Putney, Treasurer.

Land and mining rights were immediately acquired, and it was decided to put down the shaft about 1000 feet south of the second test well, and twenty-seven feet higher. The shaft was started on Sept. 15, 1890.

An interesting fact connected with the sinking of the shaft was that Mr. Townsend invited the State Geologist to make a detailed examination of the work as it progressed, and also offered every aid in collecting geological and palaeontological specimens from the shaft, which he begged the State to accept. The State accepted Mr. Townsend's kind offer and Mr. D. D. Luther, of the State Geologist's staff, entered upon the work in May, 1891. Thus it was that a very complete and detailed record of the sinking of the shaft was kept, and many valuable specimens obtained.

Mr. Luther's "Report on the Geology of the Livonia Salt Shaft," accompanied by an introductory chapter by Dr. James Hall, State Geologist, and an analysis by Prof. James M. Clarke, of the specimens obtained, was published in 1894, and has been of much aid to the author in compiling this account of the mine.

The work of sinking the shaft was carried on incessantly both night and day with only slight pauses, Sundays excepted, until on August 13th, 1892, a depth of 1,432 feet was reached and the shaft was finished. The very detailed and complete report of the geological formations passed through, compiled by Mr. Luther takes up 41 pages in his report, and is therefore

too lengthy to be incorporated in this account. The inquiring reader is referred to Mr. Luther's report. An abridged report on the sections passed through in sinking the shaft is herewith appended.

	Feet.
Drift	64
Hamilton Shales and Limestones	748
Marcellus Shales and Limestones	54
Corniferous Cherty Limestones	135
Water Lime	23
Gypseous Shales and Limestones.....	324
First Salt in Thin Veins.....	
Shales and Limestones with Salt and Gyp-	
sum in Small Proportion.....	21
First Salt Bed, 8 in. to 3 ft. Thick.....	
Shale	4
Shale with Salt in Seams and Veins.....	2
Crystal Salt	2
6 in. Shale	1
Salt with Fragments of Shale.....	11
Salt	13
Limestone	6
Shale	1.6
Salt with Fragments of Shale.....	15.6
Limestone	2
Shale with Thin Layers of Salt.....	4
Bottom of Shaft	31.6
	<hr/>
	1461.8

The most remarkable fact discovered in sinking the shaft and mining the product, was the very fine quality of salt obtained. Whereas the salt mined at Retsof and Sterling is of a gray color, that obtained at Livonia is white or pinkish in color. The chemical analysis shows a very pure product.

The size of the shaft was 14 by 24 feet.

The Livonia mine was finally bought by the Retsof Mining Co., and in 1899 the mine was shut down and shipments ceased. In 1908 the buildings at the mine were demolished. We append herewith for the reader's edification, an extract from a local newspaper under date of March 23, 1908, which tells about the abandonment of the mine and other interesting details:

"Livonia, March 23.—The work of tearing down the large head house and breaker and other buildings of the Livonia Salt Mine, situated near this village, the contract for which was let a few weeks ago to Charles Morgan, of Pavilion, is

well under way. His contract also calls for taking out all the machinery of the plant. Most of the lumber in this enormous head house is to be loaded upon cars and shipped to Ithaca. It is estimated that there are 600,000 feet of lumber in this building.

"This is not new work to Mr. Morgan, as three years ago he took down the immense building at the Lehigh salt shaft near Pavilion, which took nearly seven months. He estimates that with fairly good weather he can finish this job in about four months.

"With the demolishing of these buildings, ends the greatest industry Livonia ever had or probably will have for years to come. The Livonia company began the work of sinking this shaft on Sept. 15, 1890, and the depth of 1450 feet, to which it was sunk, was reached August 13, 1892. Thus nearly two years were spent in digging this hole into the earth. The work of mining salt was then begun, and continued for about seven years, or until 1899, when the shaft was shut down. The Retsof Mining Co., owners of the property, also owned other salt mines, and it gave as a reason for shutting down that the work of mining the salt from this one was too expensive; it was able to get it much cheaper from its other plants.

"A visit to this industry when the mine was in operation was one always to be remembered. Two cages, or elevators, were run in the shaft, one ascending as the other descended, at the rate of about forty miles an hour. The bottom of the mine was laid out in streets as the work of taking out the veins of salt progressed, and reached far out under the surrounding farms. A short railroad line, called the Livonia & Lake Conesus Railroad, connected the mine with the Erie, and from thirty-five to fifty railroad cars loaded with salt were shipped daily. About one hundred and twenty-five men were employed in the mine and about seventy-five above the shaft, and the company's payroll amounted to about \$8,000 a month.

"This company operated a pumping station, by which it took water from Conesus Lake, and under contract has pumped the water for this village. Since the mine was shut down two firemen have kept the fires in the boilers and have also done the pumping for the village, but now that the plant is to be taken down other arrangements will have to be made by the village to obtain water. The present contract expires the coming November."

GREIGSVILLE MINE

During 1890 the Greigsville Mining Co. was organized for

the purpose of mining salt, and on October 15th, of that year a shaft was started on the Gray farm on the west side of the Delaware, Lackawanna and Western Railroad tracks, about three-quarters of a mile north of Greigsville station, and only a half a mile distant from the Retsof shaft. The shaft was put down on the sight of a test well which had been sunk some years before to ascertain whether salt was present at that locality.

The size of the shaft was 22 by 11 feet. For some years salt was mined by the company, but the Retsof Mining Co. finally obtained control of the property and the mine was soon after shut down, as salt could be more advantageously obtained at the other mines owned by this company. The Retsof Mining Co. finally came under the control of the International Salt Co., and this mine of course, is now owned by them. The mine has never been reopened.

THE STERLING MINE

Among the important mines in the country, that of the Sterling Salt Co. at Cuylerville must be accorded a prominent place. Although of recent formation as compared with the other mining companies in the State, this company in its twelve years of existence, has assumed an important position in salt annals, and its product is favorably known throughout the land.

The company was organized on May 18, 1905, with the following officers and directors, almost all of whom still retain their original connection with the enterprise: President, William A. Hazard; Vice-President, Edward W. Brown; Treasurer, Edwin L. O'Bryan; Secretary, James W. Brice. The additional directors were Vernon H. Brown, Walter L. Clark, Sylvanus J. Macy and Paul J. Rainey. The company was capitalized at \$1,000,000, and a small village started in the immediate locality of the mine, to which the name "Halite" was given, this being the scientific and chemical name for salt. The settlement has a post-office and railroad station, and this particular spot has since been known by the above name.

The shaft was started simultaneously with the buildings, in 1905, and the entire plant was completed in 1907. The shaft was twenty feet square, and was sunk to a depth of 1100 feet, where a strata of salt twenty-one feet in thickness was encountered.

The digging of this 1100 feet hole was a difficult undertaking, and although a large force of men was employed, working in three shifts of eight hours, it was more than a

year before the first small salt deposits were opened. The first 100 feet of excavation was in earth and was the work comparatively easily executed, but thereafter quicksand, water, gas and the hardest kind of rock were encountered and the progress was slow. Experienced miners from the copper mines of Michigan were employed and while the work was tediously slow at times, every obstacle was in the end overcome and the completed shaft is a model in all respects. So carefully had the work been planned that it was required that a plumb line extending from the center of the shaft at the surface should touch the exact center of the shaft 1100 feet below. Upon completion this test was applied and it was found that the requirement of the engineers had been fulfilled.

The shaft is timbered throughout its entire length with oak and lined with hemlock planking, and divided into two hoisting ways each 6 by 8 feet and a ladder road 4 by 8 feet.

While this work was in progress the buildings necessary for the operation of the plant were being constructed and as soon as the main salt vein had been uncovered the company was ready to commence operations.

In the mining operations of the plant long auger drills driven by small electrical motors, bore holes from six to ten feet deep into the solid wall formed by the rock salt. These holes are charged with dynamite, and the blast blows out and to a large extent shatters the salt, which is then loaded into mine cars and drawn to the foot of the shaft. Each car is then placed upon one of the two cages which run alternately up and down the two compartments, and when carried to the surface is mechanically dumped, the car not leaving the cage in the process, and both descending immediately thereafter while another load comes up in the other hoisting way.

The salt bed is about 1100 feet beneath the Genesee Valley at the site of this important industrial undertaking, which has its foundations laid 614 feet above sea level. The mineral wealth is found in two layers in this section of the field, the upper one having a thickness of 21 feet, and it is in this stratum that mining is now in progress. The dip of the rocks of the locality bearing to the southwest, the works are so situated that as the drift extends into the saline deposit, gravity will assist in the conveyance of the product from the excavation to the elevator.

The saline product undergoes no change except in form, from mine to market. As taken from the bed it includes pieces of varying dimensions, which at the elevator top pass into the crushers. These machines are of two classes, those

with tooth-rolls having capacity to reduce chunks up to 12 by 18 inches in size, and those of rotary movement from 6 to 1 inch. The broken crystallizations in their onward course to the bins, descend over triplicate sets of screens of copper mesh, and so arranged in degrees of fineness, that all the commercial gradations are separated and finally fall into their allotted places. Underneath the bin-building run the railway tracks, and the loading of trains is readily accomplished. The first carload shipment from the works was made November 1st, 1906.

The buildings at the mine are of concrete re-enforced with twisted steel, upbuilt in accordance with the Ransome system. The Head House as the building over the mine shaft is technically known, is 30 by 48 feet in ground extension and 124 feet in height. Adjoining it is the Bin House also containing the screen-rooms, 30 by 140 feet and 80 feet high. The Sacking House is 130 feet long, 25 feet wide and 25 feet high. The Engine House is 45 by 60 feet and the Boiler House 38 by 60 feet in extent, with connected coal-bunkers of adequate capacity. The living rock bears the foundations of all these great constructions, with concrete beds under boilers and engines, the supporting mass beneath the hoisting drum being 28 by 32 feet and 11 feet in thickness, while iron girders uphold the floors and roofs with beams of oak in open interior work.

The equipment of this mining establishment is commensurate with the substantial plan of its erection. All machinery is of the latest pattern for the purposes designed, and of the highest grade of workmanship. Four massive boilers of 250 horse-power each, have added efficiency through the use of superheaters rated to carry steam at 150 lbs. Two four-valve driving engines, one of 150 and the other of 190 horse-power, have direct connection with the dynamos which furnish the electrical energy in use in all departments. The Hoist is the masterpiece of mechanism of the entire works. The two-faced conical drum to which is attached the hoisting cable is controlled by two engines with steam cylinders 18 by 42 inches, capable of readily developing 500 horse-power."

Since the completion of the works in 1907, the Sterling Salt Co. has constantly mined and shipped salt.

EVAPORATION SALT WORKS

Besides the mining operations in Livingston County which we have just detailed, there were quite a few evaporation or fine salt works established in this county. These plants were erected as a result of the discovery of salt in the

adjoining county of Wyoming, and the success which attended the sinking of the Retsof mine. None of them ever grew to very large proportions or assumed an important place in the industry, and all of them are now abandoned with one exception, the Genesee Salt Co. We shall give some particulars of these plants according to priority of erection.

The author wishes to make an apology for this portion of the book relating to the abandoned fine salt works in Livingston County. Owing to the unimportance of these plants, and the fact of their being abandoned so long, full and accurate records of their existence are lacking. Added to this is the reluctance of those who were associated in the undertakings, to furnish information concerning them. The plants were unsuccessful and money losers for those connected with them, and of these personages, those who are still with us evidently do not care to be reminded of unpleasant things.

A similar state of affairs exists in Wyoming County, with respect to the abandoned works in the vicinity of Warsaw.

Before proceeding with our account of the fine salt works in Livingston County, we must make mention of the first discovery of a salt spring in the county, which was in 1834. This was an isolated instance, and the brine did not continue to flow, but ceased after a while. The location was at York, and probably very few know of this early indication of the great salt deposits of Livingston County. No salt was ever made at this spring.

The first salt works in the county were those of the Livingston Salt Co., at Piffard, which were erected in the latter part of 1884, although the company was organized a year earlier. The grainer process was employed and the plant had a daily capacity of 500 barrels. The company's two wells were sunk during 1883, and both were about the same depth. The section of one of these wells, probably the first one driven, is here given. The record was supplied by Mr. Gitman, one of the drillers:

Soil	158	feet
Shale	77	"
Corniferous limestone	150	"
Lower Helderberg limestone and shales	453	"
Salt	18	"
Shale	6	"
Salt	11	"
Shale	4	"
Salt	2	"
Shale	20	"

Salt	62 feet
Total	961 "

This was what is known as a natural salt well, brine in profuse quantities of 60 degree salometer test being encountered at 695 feet. The flow was exceedingly strong, and overflowed the top of the well and spouted high up into the derrick. After a few days it settled down to 50 feet beneath the surface, where it remained, and furnished the means for dissolving the rock salt below, without the necessity of pumping in outside water.

An analysis of the salt produced at this block was made by Dr. Englehardt, and published in the Report of the State Geologist for 1885, from which we quote:

Moisture .....	.5467
Insoluble matter .....	.0810
Sulphate of lime	1.0870
Chloride of calcium .....	.1495
Chloride of magnesium .....	.0546
Pure salt	98.0812

Total 100.0000

The Livingston Salt Co. was absorbed by the Genesee Salt Co., and when that company failed and its property was sold at Receiver's Sale on the 20th day of July, 1903, it is presumed that the Livingston block was bought by Alex. Kerr, Bro. & Co., who were the purchasers of the Genesee plant. The Livingston outfit was known as the "annex" of the Genesee works. The property, together with wells, buildings, etc., amounted to 30 acres. No salt has been produced since the above date.

LACKAWANNA SALT CO.

The Lackawanna Salt Co. was organized immediately after the Livingston plant was erected. Their works were located about two miles north of Mt. Morris, between that station and Moscow. Two wells were sunk and we herewith append records of both of them:

No. 1 Well.

Hamilton shale	600 feet
Corniferous limestone	140 "
Lower Helderberg limestones and shale	463 "
Salt and shale mixed	12 "

Clear salt	23	feet
Hard rock	20	"
Salt	75	"
<hr/>		
Total	1333	"
 No. 2 Well.		
Salt struck at	1229	feet
First bed of salt	18	"
Rock	46	"
Second bed of salt	57	"
<hr/>		
Total	1350	"

The grainer process was used, also open pans. The plant has been abandoned for many years.

GENESEE SALT CO.

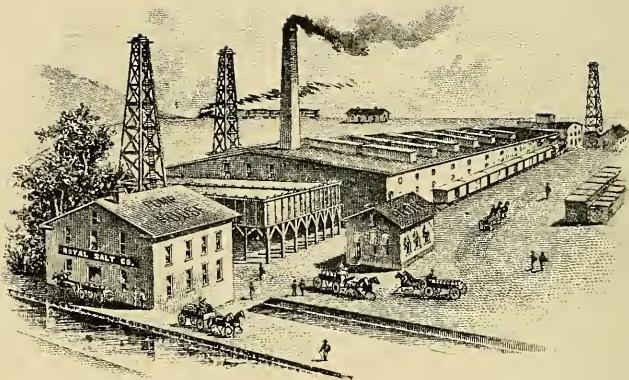
Early in 1885 the plant of the Genesee Salt Co., at Piffard began manufacturing salt, with a daily capacity of 1000 to 1200 barrels. Although now in different hands from the original owners, this block still produces salt, and is the only fine salt plant in the county to do so at the present time, the others having been abandoned some years ago.

Five wells were sunk, and the plant erected was considered very large at that time. In view of these facts, the company was considered to have a bright future in store, and to be one of the important enterprises in the field. The works were situated one-half mile south of the Livingston block, and the grainer system was used, also large pans. The following section is typical of the wells. In this particular well, salt water of 68 degrees salometer test was found at 708 feet, in sufficient quantity for the use of the well without the addition of outside water or pumping. Indeed, when first struck, the flow was so strong that the brine rose above the top of the derrick, in spite of the fact that drilling apparatus weighing more than four tons still remained in the well.

The company maintained an office at 6 Harrison Street, New York, and an especial effort was made to secure business from butter and cheese manufacturers.

During November and December, 1891, and January, 1892, the manufacturing department was rebuilt, to take care of increased business, and the plant was temporarily shut down during these months.

The gentlemen interested in the company were: Dr.



ROYAL SALT COMPANY

Mt. Morris, Livingston County, N. Y.

Henry G. Piffard, President; and the following also were officers or directors: Edward P. Fowler, James Wood, William H. Male, Henry G. Morris, Richard H. Downing and Henry P. Loomis.

In 1902 the company became insolvent, and a voluntary dissolution being asked for and granted, Dr. Piffard was appointed receiver on Jan. 13, 1903, and the property and assets of the company were sold at Receiver's Sale on July 20, 1903. The property on which the plant was erected amounted to 20 acres, together with the Livingston property amounting to 30 acres, all of which were included in the sale.

The Genesee plant was purchased by Alex. Kerr, Bro. & Co., who were formerly owners of the Rock Glen works at Rock Glen, Wyoming County, and who have a selling organization and warehouses at Philadelphia and Baltimore.

ROYAL SALT CO.

Simultaneously with the Genesee plant, the Royal Salt Co. erected a plant at Mt. Morris, in the town of the same name. Three wells were sunk, and a complete block was erected. The record of the first well is as follows:

Soil	191	feet
Shale	479	"
Corniferous limestone	150	"
Hydraulic limestone	50	"
Lower Helderberg	250	"
Saline shales	170	"
Salt and shale mixed	4	"
Salt	20	"
Slate	35	"
Salt	73	"
<hr/>		
Total depth	1422	"

This company, organized in July, 1885, sunk a well, and

CONESUS LAKE SALT AND MINING CO.

This company, organized in July, 1885, sunk a well, and completed a plant at Lakeville, near the foot of Conesus Lake, in the eastern part of the county. Record of the shaft as given by Mr. L. P. West, secretary of the company, is as follows:

Soil	54	feet
Shale, the lower part bituminous with gas and some oil	454	"

Corniferous limestone	140	feet
Helderberg limestone	325	"
Shale	5	"
Salt (very clear)	25	"
Soft shale	30	"
Salt	15 or 20	"
Total	1053	"

Although the title of the company would seem to indicate that a salt mine was contemplated in addition to the evaporation plant, no mine was ever sunk. The plant was destroyed by fire in 1885, shortly after it was erected. Frank E. Stone was President of the company, L. P. West, Secretary, and F. H. Armstrong, Superintendent.

YORK SALT CO.

During April, 1884, a well was sunk by the York Salt Co., at York, in the northwestern part of the county. The following record of the well was supplied by Mr. M. B. Gilman, president of the company:

Clay	52	feet
Hamilton shale	128	"
Corniferous limestone	140	"
Helderberg limestone	330	"
Red shales	10	"
Blue-green shales	84	"
Salt and shales mixed	6	"
Salt	10	"
Shale	27	"
Salt	41	"
Total	828	"

A strong brine impregnated with sulphur, was found at 233 feet, which rose 100 feet in the well. Gas was also present at this depth. At a depth of 375 feet, an ample supply of water was met with, which served to make the brine.

A second well was sunk and a block erected during 1886. The grainer system was used.

An analysis of the brine obtained in the first well is here-with appended:

Sulphate lime	1.52
Chloride of calcium .....	.69
Chloride of magnesium .....	.05

Salt	97.74
Total	100.00

This plant has been abandoned for many years.

LEICESTER SALT AND MINING CO.

On September 14, 1885, the Leicester Salt and Mining Co. began to sink a well at Cuylerville, and a plant was completed about 1887. Section of the well is as follows:

Soil	184	feet
Hamilton shales	286	"
Corniferous limestone	140	"
Hydraulic lime and shales	500	"
First salt stratum	4	"
Shale	3	"
Second salt stratum	28	"
Total	1145	"

The 32 feet of salt encountered was said to be pure rock salt.

The system of salt manufacture used at this plant was known as the Lewis process. It differs from the ordinary open pan system in that a number of small pans are used instead of one large pan. The Globe Salt Co., at Wyoming, in the county of the same name, also employed this process. A good description of it is given by Mr. I. P. Bishop in the Report of the State Geologist for 1885:

"The Lewis process is a modification of the pan process, and is so called from its inventor, Mr. Sylvester Lewis, of Rochester. The evaporating apparatus consists of ten pans 20 x 10 feet, each on an arch with its own grate and flue. There is also one long pan 15 x 100 feet, with a grate at each end. The hot gases from the smaller flues are made to pass under the larger pan and thus lose the greater part of their heat before passing to the chimney. The brine is heated to 220 degrees Fahrenheit in the larger pan, to precipitate the gypsum, and then drawn to the smaller pans to be evaporated. The principal advantage claimed for this process, is that any pan can be removed for repairs or for cleaning without stopping work in the others."

The President of the Leicester Co. was Rev. John Rippy, of Cuylerville. Only one well was sunk. Some time after 1892 the name was changed to the Phoenix Salt Co., and it is believed that an additional well or wells were sunk. The

plant has been abandoned for some years. In spite of the name, no mining was ever done by this company.

NATIONAL SALT AND CHEMICAL CO.

The above corporation operated a plant at Lakeville, with three wells in the early "nineties" of the past century. It has been impossible to obtain any further particulars.



Chapter VIII.

SCHUYLER COUNTY

SCHUYLER COUNTY takes an important place among the salt producing counties of today. The salt deposit beneath the surface of the county at the head of Seneca Lake attains the greatest thickness yet ascertained in the State, that of 300 feet. The salt stratum is 800 feet below the surface at that point and consequently about 1,350 feet below sea level. Besides the great thickness of the strata, this locality possesses an advantage from the fact that the great coal beds of Pennsylvania are not so far away and the salt plants situated at the head of Seneca Lake can ship salt either by rail or water.

Within its borders is located the large modern Glen Works of the International Salt Co. a few miles north of the village of Watkins, on the western shore of Seneca Lake. This plant is the largest and most up-to-date plant in the State, and its huge bulk and towering smokestack is a familiar landmark throughout the countryside. The plant of the Watkins Salt Co. is also located at Watkins, just east of the village, on a small private canal running down to the head of Seneca Lake. From its completion in 1899 up to the present day, salt of a high quality has constantly been produced at this plant and today it takes no unimportant rank among the plants of the State. Besides these two plants there formerly existed an abandoned works or "block" situated east of the plant of the Watkins Salt Co. on a small canal or "cut" running into the lake. This plant was formerly owned by the Union Salt Co., but salt has not been made here for many years and the wells and buildings were devoid of machinery and were in a very dilapidated condition when a recent fire wiped them out entirely.

The first knowledge of salt in Schuyler County was contemporaneous with the early settlement of the region and was not due to the sinking of the Horton well in 1864 or the Seneca Lake Mining Company's well in 1865, although these wells gave the first actual discovery of the strata.

It was a common practice for the first settlers to lend their large iron pots or kettles to the Indians on their way to the head of the lake where the village of Watkins now stands. The Indians would take these borrowed vessels with them up to the head of the lake and boil sufficient salt for their needs from the springs there present. The Indians generally would return the pots filled with salt as a reward for the loan of them. The

first white settlers took up their abode in this region around the head of Seneca Lake about 1790, and this early salt-making by the Indians took place at this time.

The springs from which the Indians obtained their supply of salt did not arise from the great salt bed underlying this region, but were seepings from the small deposits of the upper rocks. However, these springs were an indication of the great mineral wealth beneath and awakened a desire for further knowledge of the deposits which was not appeased until discovery.

The pioneer well of Schuyler County was located at the head of Seneca Lake, on the eastern shore, near the spot where the stream of Glen Seneca flows into the lake close to the village of Watkins. Thomas Horton in the year 1864 owned a distillery at this point, and during that year started a springpole drill in a marshy spot marked by a deer-lick. During the same year William Newman, Orland Hourd and other prominent citizens of Watkins village organized a corporation known as the Watkins Salt Co., with the avowed intention of finding and manufacturing salt. This pioneer company should not be confused with the present Watkins Salt Co., which was organized in 1898. This company, on the land owned by Horton, drilled a well to a depth of almost 1,000 feet, at which depth they stopped, as nothing but brackish water was found.

The second attempt to reach the salt deposits was made by the Seneca Lake Mining Co. along the banks of Catharine's Creek near the village of Montour Falls, which was at this time known by the name of Havana. Dr. E. W. Lewis was president of the company and R. H. Merriott filled the office of general manager. The drill, followed by an eight-inch cast iron tubing, was forced through clay and gravel deposits until a depth of 365 feet was attained. At this point operations were abandoned, as no indications of brine or salt had been found.

Although these two pioneer attempts were unsuccessful, still they showed the laudable desire of the citizens of Watkins to manufacture salt, which was gratified in no uncertain manner by the next generation.

Salt activities in the county lay dormant from this time until 1882, when the actual discovery of the great salt strata underlying this territory was made.

The Watkins Oil Well Co. was organized May 30th, 1882, with the avowed object of drilling for petroleum, gas, salt or other minerals. The capital stock was fixed at \$5,000 and the following gentlemen acted as officers: L. M. Gano, president; Edgar S. Payne, vice-president; John J. Smith, treasurer, and A. A. Cowing, secretary. The well was located on the hillside west of the village of Watkins, near the Glen Springs Hotel, and on a site of a famous spring of pioneer days which was



INTERNATIONAL SALT COMPANY
Glen Plant; Watkins, Schuyler County, N. Y.

known by the Indians to contain medicinal properties. Drilling was begun on August 30th, 1882, and was continued until an immense influx of brine was met with at a depth of 1,513 feet. At this point it was considered that brine of a sufficient strength for salt-making had been reached and operations were concluded. A report was issued by the company under date of September 28th, 1882, stating this fact and accepting the measurement of the well, 1,513 feet 9 inches, made by John Knight and John J. Smith, the treasurer.

An analysis of the brine showed, however, that there were present in the brine, ingredients which interfered with the drying of the salt held in solution, and the well remained idle until 1890, as is stated in the following paragraph.

Although put to no use until eight years later, this Watkins well was a remarkable enterprise and discovered the great salt strata which has given forth the large quantity of salt made in Schuyler County from that day to the present.

In 1890 the well passed to the ownership of W. E. Leffingwell, the proprietor of the Glen Springs Company and Hotel. Mr. Leffingwell, aware of the value of its brine for the baths of a health institution, cleaned it of obstructions for utilization by the Glen Springs Co. From 1890 until 1897 the well provided the brine used in the medicinal baths of the Glens Spring Co. and Hotel.

In 1897 a great flow of gas issued from the well, and this commodity not only furnished heat for all cooking purposes, but was used as fuel for two 40-horsepower boilers which produced the steam used in running the dynamos for lighting the hotel and bath establishment.

The gas belt of the Seneca Lake district is of great value and possibilities, and although defined to some degree, is yet an almost unexploited region in this particular.

GLEN SALT WORKS

The discovery of salt by the Glen Springs well, as we may call it, led to the formation of the Glen Salt Co., who erected and worked the first salt block in Schuyler County. This plant has continuously produced salt up to the present, although it has passed through two or three different ownerships and the buildings and machinery have been completely rebuilt.

The Glen Salt Co. was organized May 22nd, 1893, with George C. Otis as president and John A. Clute, secretary and treasurer. Joseph C. Buxton also was interested in the corporation. The company was capitalized at \$100,000 and its duration was fixed at fifty years. The purposes of the company as expressed in its charter were as follows: "Drilling wells, pump-

ing brine, mining, manufacturing and selling salt in the town of Reading, Schuyler County, N. Y., on the west shore of Seneca Lake, about one and one-half miles from the village of Watkins." Messrs. Clute and Otis had previously purchased the land from the Nelson Cowan estate on December 5th, 1892, and upon the organization of the company they turned over to it their purchase. The land, as stated in the charter, was about one and one-half miles north of the village of Watkins on the west shore of the lake. The site had formerly been used by the Morris Run Coal Co. as a trans-shipment point and they in turn had bought the property, consisting of forty acres, from O. R. Corbett in the autumn of 1863 and spring of 1864.

On this property the drilling of the first well was begun in February, 1893. The salt bed was struck at a depth of 1,841 feet from the surface and continued for 61 feet through the solid salt, at which depth (1,902 feet) the drilling was stopped and the well finished, although the bottom of the salt bed had not been reached. In the second or third wells, drilled a few years after the first, this fact still holds true, as the bottom of the salt bed was not reached in either of these wells at the cessation of drilling. The second well, sunk in 1894, a year after the first, went through 102 feet of solid salt, and the third well, in 1896, ended in solid salt at 1,927 feet. All three wells were drilled by F. J. Adams of Bradford, Pa. The geological formation in which the salt is found is the shales of the lower part of the Portage group. The strata dips slightly towards the north, the degree of dip being about ten feet per mile. Water is forced down the wells at pressure by powerful force pumps and, becoming impregnated with salt, is pumped up to the surface again as brine and conveyed by means of pipes to the vacuum pans and grainers, where it is evaporated.

The buildings composing the plant were erected during 1894. At the beginning of operation, during the latter part of 1894, the plant or "block," as it is locally called, consisted of several connected buildings bordering on a railroad siding and a canal slip, thus being well situated for either rail or water shipment; an advantage which plants do not possess that are situated away from the Erie Canal and lakes connected with the canal.

The buildings consisted of the boiler house, 55 by 100 feet in size; engine and pump room, 48 feet square; coarse salt bin-house, 48 by 64 feet; grainer and vacuum-pan building, 80 by 160 feet; main storehouse, 100 by 206 feet, and the mill house, 100 feet square. Later on the boilers were increased and consisted of six of 200 horsepower each and ten of 150 horsepower each. Two grainer houses also have been added, one 100 by 300 feet and the other 50 by 300 feet. The capacity of the vacuum pan was 1,000 barrels per day and the entire plant pro-

duced 250 tons of all grades of evaporated salt every twenty-four hours.

The following gentlemen have filled the position of manager of the works from the beginning of operation up to recent times: John A. Clute, Charles L. Paar, George C. Otis, H. C. Stouffer and E. A. Hardt.

In 1899 the plant was bought by the National Salt Co. together with many others throughout the State, and was operated by them until 1903, when this corporation failed and went into receiver's hands. On May 25th, 1904, the Receiver's Sale of the National Salt Co. was held and the Glen Works came into the possession of the International Salt Co., a corporation formed for the purpose of taking over and operating the plants which had belonged to the National Salt Co.

Under the ownership of the International Salt Co. the Glen Works have prospered greatly. During 1907-1908 the plant was entirely rebuilt, and the huge structure which now stands forth so prominently on the shore of the lake is today, with its sister plant at Ithaca, the most modern and by far the largest and most efficient plant for the manufacture of evaporated salt in the United States of America.

We append herewith a description of the plant as it is today.

The boiler house is a brick building, 162 feet long by 60 feet wide and 30 feet high. The roof trusses are steel and the roof concrete. This building contains eight 350-horsepower Fitzgibbons boilers, a modern coal conveying system, two Green Fuel Economizers—one for brine and the other for feed water—two feed-water filters and five steam pumps that are used in the operation of the plant. The boilers are stoked by hand, and are connected with a brick stack 225 feet in height, which furnishes a natural draft.

The engine house is a brick building 65 feet long, 75 feet wide and 30 feet high, and contains one 250-horsepower Knowles & Kelly engine, one 500-horsepower Ingersoll-Rand air compressor, electric lighting plant, six high-duty steam pumps and other accessories which make it complete in every respect.

The pan house is a five-story brick building, 112 feet long, 80 feet wide and 100 feet high, and contains the four vacuum pans, vacuum pumps, condenser, injector pumps, etc., necessary for carrying on the system of evaporation. The pans are all 22 feet in diameter and 45 feet from bottom cone to top dome.

The mill building is a three-story brick structure 125 feet long, 115 feet wide and 52 feet high, of modern slow combustion construction. The columns and girders are of steel, the floors are of 6-inch and 8-inch plank spiked together and the roof is of concrete. This building contains three Hersey steam dryers, three Newago separators, four automatic weighing and sewing

machines, elevators, conveyors, etc., necessary in the production of dairy salt.

The coarse common fine salt plant is housed in a wooden building 285 feet long by 50 feet wide, and consists of six grainers, each supplied with automatic rakers. The ground alum salt plant consists of six grainers.

The two storehouses are 275 feet long by 118 feet wide and 280 feet long by 118 feet wide, respectively, and have a capacity for storing about 22,000 tons of salt.

The cooper shop is 175 feet long, 40 feet wide and 25 feet high, and has berths for eight coopers.

There are seven wells in operation at this plant.

WATKINS SALT CO.

Five years after the establishment of the Glen Works, the plant of the Watkins Salt Co. was erected east of the village of Watkins, at the head of the lake. The site of the works comprises twelve acres of land formerly belonging to the Lembeck estate, purchased in September, 1898. The wells were first driven on the land adjacent to the works, but finding no rock salt at this point, they were finally located on the west side of the village about a half mile to a mile away. The brine is forced from these wells to the works by air pressure supplied by an air compressor developing 160 horsepower. At the time of organization the officers of the company were as follows: F. W. Wardwell, president; P. M. Spencer, treasurer; John A. Clute, secretary, and Warren W. Clute, general manager.

Canal slips and railroad sidings were already present, as this location was used by the Fall Brook Coal Co. as a trans-shipment point for coal prior to the erection of the salt block.

The erection of the buildings and machinery was commenced immediately after the purchase of the land, in September, 1898, and were completed in the early fall of 1899. The production of salt was commenced in October of that year and since then has been continued on an extensive scale with uniform success. Much of this success is due to Mr. Warren W. Clute, who has been general manager of the plant since its inception and who at the present writing holds the combined office of president and general manager. Mr. Clute is one of Watkins' most prominent men, and his residence high up on the western shore of the lake, overlooking the village and valley, is the finest situated in the neighborhood.

During the month of February, 1907, Mr. F. W. Wardwell of Cleveland, Ohio, who was president and principal stockholder of the company, disposed of his stock, which was purchased by Watkins citizens. The new stockholders elected Mr.

Warren W. Clute to be president and general manager, Mr. John A. Clute to be vice-president and treasurer, and Mr. M. B. Hughey, secretary. These officers still hold their respective positions. By this change the concern is now a distinctly local enterprise.

The brine for the works is furnished by four wells 1,800 feet deep. As has been stated before, the wells are located in the western part of the village, about a mile away from the works. The brine is forced from the wells to the works through pipe lines by means of air pressure.

The manufactory is composed of about four adjoining buildings constructed of pine and hemlock, with hardwood floors throughout. The principal building is 138 by 368 feet in size and contains the storage, shipping, milling and packing departments. An adjoining building, which is 100 feet square, contains four tanks, each of 5,000 barrels capacity, in which the brine coming from the wells is treated.

The vacuum pan room, in addition to the pan, contains the large pumps used in forcing the brine through the plant. This room is 48 by 68 feet in size. The vacuum pan is sixteen feet in diameter and has a capacity of making 1,200 barrels of salt from the brine every twenty-four hours.

The boiler house is 42 by 176 feet in size and contains twelve boilers of 200 horsepower each, provided with an induction draft system.

During recent years the plant has been enlarged and improved processes installed; therefore, the foregoing description may not be adequate for the plant as now existing.

On a recent visit to the plant the author noticed that the buildings are well arranged and the machinery and processes employed are run in a very efficient and systematic manner.

UNION PLANT

During 1899 a well was driven near the mouth of the inlet of Seneca Lake, at the eastern limits of Watkins, by George S. Coon and P. H. Hawes.

Soon after the sinking of the first well a company was formed known as the Seneca Lake Salt Co. The first president was John Gray, and the secretary and treasurer, Wilbur F. Smith.

The plant was situated on the south side of the road leading into Watkins village from the east. When completed for operation the plant had a capacity of about 100 tons per day. A spur was built from the tracks of the Northern Central Railroad to the plant.

The boiler and vacuum-pan house was 80 by 60 feet in size;

the storage house 140 by 60 feet, and the grainer building 100 by 32 feet. Four boilers, each of 150 horsepower, supplied the steam for the plant. Two wells supplied the brine, which was pumped into a large settling tank.

In 1902 the business passed into the hands of the Union Salt Co., whose officers at that time were E. P. S. Wright, president; M. H. Arnot, vice-president, and P. H. Hawes, secretary and treasurer.

Some time subsequent to this change in ownership the plant was shut down, and remained in that condition until it was completely destroyed by fire. The blaze was discovered by the night watchman, who gave the alarm, but the plant was so far from the village that the firemen could give no assistance, as there was no hydrant at that point.

With the mention of one other well from which salt was never made, the history of salt in Schuyler County can be completed. This was a test well sunk with the hope of finding salt at Corbetts Point, two and one-half miles north of the Glen Works of the International Salt Co., on the western shore of Seneca Lake. The well was sunk during the year 1904, and for the first 325 feet, the bore was 10 inches in diameter. From this point down to 1,250 feet an 8-inch bore was used, and below 1,250 feet a 6½-inch bore was used down to the extreme depth of 1,725 feet, where salt was found, a thin stratum of soft rock separating it from the limestone layers above. Gas was met with in considerable volume throughout the lower formations of the shales. Nothing further was done with this well and no salt of any kind was ever made here.



Chapter IX.

TOMPKINS COUNTY.

TO MPKINS COUNTY was formed from parts of Cayuga and Seneca Counties, on April 17, 1817. The county was further increased by the addition of three towns from Tioga County on March 22, 1822, and again in 1854 when a portion from Schuyler County was added.

In 1885 a company looking for gas, sank a test well to a depth of 3185 feet, and encountered seven distinct veins of salt. The total thickness of these veins was 248 feet. The fine showing made by this well was the cause of the three plants later put down in this county, and the expectations of the manufacturers have been achieved in no uncertain manner. As an evidence of the notoriety which the digging of the well produced at the time, we append herewith a newspaper clipping, describing the well:

"The most remarkable deposit of rock salt that has been discovered is at Ithaca, at the head of Cayuga Lake. It is commented upon by Dr. Englehart as something wonderful. The discovery was made two or three years ago, while the projectors of the well were looking for gas, the work of drilling having been undertaken by popular subscription by the citizens. The site of the well is on the southern outskirts of the village, about a mile from Cornell University grounds, but in the valley, the mouth of it being less than fifty feet above the surface of the lake. The total depth penetrated is 3185 feet, the salt-bearing stratum is 470 feet, and the aggregate thickness of solid rock salt is 248 feet. Nothing like this is revealed by any of the other wells in the State. The salt layer next to that at Ithaca in thickness, as shown by Dr. Englehart's table, is one at Pifford, Livingston County, which is 98 feet. The Ithaca stratum is, therefore, 150 feet thicker than the next nearest in comparison. There are seven layers in the total deposit. The first one, struck at a depth of 2244 feet, is 24 feet thick. Then follow a layer of shale 6 feet thick, a layer of salt 54 feet thick, a layer of shale 12 feet thick, another salt layer 17 feet thick, shale 31 feet thick, salt 21 feet, shale 67 feet, salt 42 feet, shale 24 feet, salt 48 feet, shale 82 feet, and salt again 42, making the total of solid salt 248 feet. The drillers went down 468 feet further through various kinds of shale, and then quit. A faint flow of gas was obtained, but no effort has been made to utilize the vast store of salt they encountered."

This well was at Ithaca at the head of Cayuga Lake, the exact location being about one and a half miles south of the head of the lake. A careful record of the well was kept by Prof. Charles S. Prosser of Cornell University, and the results published by him in the "American Geologist," of October, 1890.

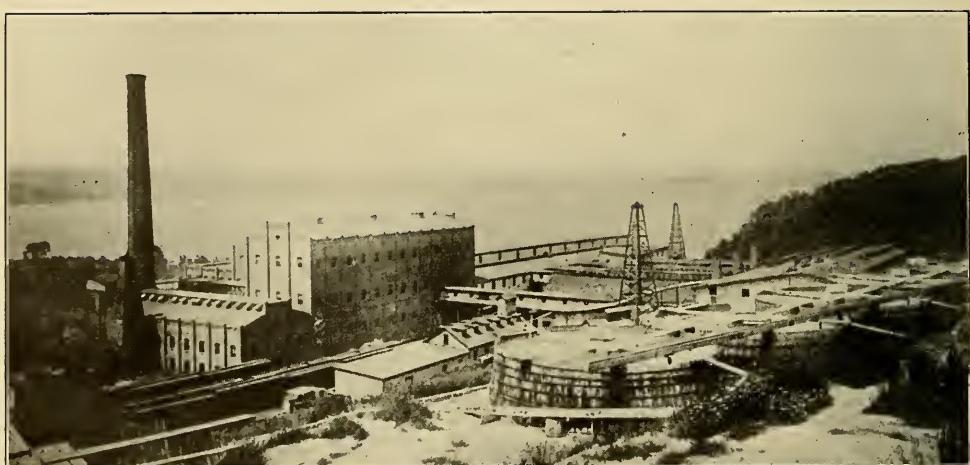
The section is as follows, according to Prof. Prosser:

	Strata in feet	Depth of Well in feet
Portage shales	340	340
Genesee slate	100	440
Tully limestone	30	470
Hamilton group	1142	1612
Marcellus shale	82	1694
Corniferous (Onondaga) limestone..	78	1772
Oriskany sandstone	13	1785
Lower Helderberg limestone	115	1900
Shale	344	2244
First salt, at 2244 feet.....	24	2268
Shale	6	2274
Second salt	54	2328
Shale	12	2340
Third salt	17	2357
Shale	31	2388
Fourth salt	21	2409
Shale	67	2476
Fifth salt	42	2518
Shale	24	2542
Sixth salt	48	2590
Shale	82	2672
Seventh salt	42	2714
Green shale	308	3022
Mottled green and red shale.....	6	3028
Green shale	157	3185
Total	3185	

The presence of a large quantity of salt in this neighborhood was further emphasized by a test well sunk by the Solvay Process Co. of Syracuse, at Aurora, further up the lake in Cayuga County, but in the same general locality.

CAYUGA SALT WORKS.

In 1891 was formed the Cayuga Lake Salt Co., with Mr. R. V. Lamberson as President, and a well was sunk to the salt strata at Ludlowville, town of Lansing, on the east shore



INTERNATIONAL SALT COMPANY
Cayuga Plant; Ludlowville, Tompkins County, N. Y.

of Cayuga Lake, about 10 miles north of Ithaca. A second well was sunk in 1892. During 1891 a plant was erected, with a daily capacity of 800 barrels of evaporated salt; the grainer, open pan and vacuum pan systems being used. The rock section in these wells coincided with the Ithaca test well except as to depth. On December 15, 1891, the first lot of salt was made at this plant.

During 1899 the Cayuga Lake Salt Co. was purchased by the National Salt Co., together with many others throughout the State, and was operated by them until 1903, when the latter corporation failed and went into receiver's hands. On May 25, 1904, the receiver's sale of the National Salt Co.'s properties was held, and the Cayuga Lake works came into possession of the International Salt Co., a corporation formed for the purpose of taking over and operating the plants which had belonged to the National Salt Co.

On July 4th, 1906, the salt storehouse connected with the works, and situated alongside the railroad tracks collapsed, due to weakening timbers. We herewith append a newspaper notice of that time, which gives a correct account of the accident:

"SALT BUILDING WRECKED

"Collapse of Storehouse in Ludlowville—Damage Over \$30,000.

"Ithaca, N. Y., July 4.—Word was received here to-night from Ludlowville that the storehouse of the large salt works there collapsed, with damage of between \$30,000 and \$40,000. The wreckage covered the tracks of the Auburn & Ithaca branch of the Lehigh Valley Railroad, and overturned three freight cars on a siding. Fifty thousand tons of salt had accumulated in the storehouse, and this overweighted the timber underpinning. Saturday the management of the works had discovered the timbers were weakening, and made efforts to strengthen the building. Yesterday orders were given that no employe should enter in or near the building, and this undoubtedly prevented the loss of life. The Ludlowville Salt Works is one of the largest in central New York."

Two years after this misfortune it was decided by the International Salt Co. to greatly increase their production, and the erection of two huge modern plants, the last word in salt construction, was decided upon. One of these structures, the Glen works, at Watkins, is described in the chapter on Schuyler County, and we will now concern ourselves with the large plant which was built during the summer of 1908, on the site of the old Cayuga Lake works at Ludlowville.

The collection of structures comprises nine main buildings,

supplemented by numberless smaller constructions, such as the derricks and engine-houses in and about the wells and houses for storage purposes. The main building is of brick and steel construction, and consists of four rooms, the boiler-room, pan-room, engine-room, and mill. The mill and pan-room are of three stories, while the other two are of one. This building runs north and south, parallel with the railroad tracks. It is almost a square, 200 x 200 feet. The store-house is a continuation of the main building, and is about 400 x 200. The construction here is of wood and the building is about 40 feet high. On the other side of the railroad tracks to the northeast of the main building, stands the grainer building, covering an area of 250 x 100 feet. In this building are six automatic live-steam grainers and four hand-lift or coarse-salt grainers, and three large brine tanks. Directly east of this building is the settler building, containing eight wooden settlers capable of storing about 500,000 gallons of brine. Due east from the main building stands the carpenter shop, a building 150 x 35 feet, in which is machinery for preparing lumber for purposes about the plant and a storage shed. To the south of the main building are the office and machine shop, both modest but necessary buildings. To the west of the main building and across the slip, used for loading canal boats, stands the cooper shop, a building 250 x 40 feet. The capacity of this shop is about 600 barrels a day.

The equipment in the boiler room consists of 12 Fitz-gibbons 250 h.p. boilers. In the engine room are, one Rand-Ingersoll duplex air-compressor, a Kelly-Knowlson Corliss Engine, a 30 kw. General Electric generator, and eight pumps.

This plant, which is one of the largest and most modern in the country, has a connection with the Erie Canal by means of Cayuga Lake and the connecting canal at the foot of the lake.

ITHACA SALT CO.

In 1895 the Ithaca Salt Co. was organized with L. H. Humphrey as President, and M. E. Calkins, Secretary. The initial well was drilled at Ithaca one and a fourth miles north of the test well before referred to. The plant was started during the same year and completed in 1896, when a second well was sunk. Grainers and open pans were the systems used, and the works had a capacity of 800 barrels daily, of evaporated salt. The plant is located on the low ground in the northern part of the city, near the head of the lake, and has switching connections with the Delaware, Lackawanna and Western, and the Lehigh Valley railroads, between whose tracks the plant is situated.

As the wells of this company were so near the test well, no detailed description of the rock section has been preserved, but Mr. Calkins states that the first rock was reached at a depth of 429 feet and the top of the first salt encountered at 2150 feet. At 1800 feet a vein of water was met with, which temporarily filled the well to the top. The presence of water is accounted for by the fact that the movement which caused the undulations and foldings in the rock strata at some previous period, also produced fissures and fractures through which the surface waters were enabled to reach such a depth.

The salt deposits were found to have an aggregate thickness of over 250 feet, and were encountered at depths below 2240 feet.

As was the case of the Cayuga Lake Salt Co., the Ithaca Salt Co. came under the control of the National Salt Co. in 1899, and in turn was taken over by the International Salt Co. in 1904. During recent years the production of salt at this "block" or works, has been abandoned and the buildings have been used as a bag factory by the International.

REMINGTON SALT CO.

The Remington Salt Co.'s works are situated on the east shore of Cayuga Lake at Ithaca. In answer to the author's letter asking for particulars concerning the history of the plant, Mr. R. V. Lamberson, president of the company, kindly replied with a very comprehensive letter, giving the important facts concerning the enterprise; therefore we will quote directly from his communication, so that the story may be told in his own words:

"We started to drill our wells during November, 1900, and completed them in 1901. Our company was composed of the same men as it is to-day, and I erected the plant as General Manager.

"We have three salt wells, averaging about 2200 feet deep and struck the top of the first bed of salt at about 2100 feet. There is 42 feet of salt in the first bed—then 8 feet of rock and the second bed of salt is about 44 feet.

"Our original salt works were of wooden construction and were built during 1901-1902, and we commenced to ship salt about June, 1902. We have no pictures of this plant, as everything was destroyed during our fire in November, 1916.

"We are building a new salt plant, which has not been completed, and have no picture of this, that you could use. The present structure will be as fire-proof as possible; our vacuum pan building, mill and department for the Crystalline

Salt Co.'s* carton factory, are of structural steel work, hollow tile and cement. These buildings will house our valuable machinery. There are a series of fire-walls between all of these departments and between the steel and concrete buildings named and the storehouse, which will be built of wood.

"Our plans are practically the same as the original salt works, due to the limited building space on the lake side. Our capacity is about 175 to 180 tons of salt per day, consisting of granulated, vacuum common fine and coarse salt. We have a single effect vacuum pan, three grainers and two dividend grainers. Our system of using centrifugals for extracting the excess water from the vacuum common fine salt is considered very sanitary and has been adopted recently by most of the salt works, although we have had this system since we originally built our works."

We might add that the Remington Salt Co. has always produced a very fine grade of salt, and with their new and improved works, this reputation is sure to continue.

*The Remington plant packs table salt in cartons for the Crystaline Salt Co., of Boston, Mass.



Chapter X.

WESTERN NEW YORK SALT MANUFACTURERS' ASSOCIATION AND NATIONAL SALT COMPANY

DURING the late "eighties" and early "nineties" of the nineteenth century, an association was formed of those manufacturers who were operating in the western part of the State, principally in Wyoming and Livingston counties. The objects of the association were to encourage the manufacture and sale of salt in this territory, to adopt ways and means towards a more efficient scheme of manufacture and selling, and in general to promote the best interests of the industry and to engender a friendly, reciprocal feeling between the many manufacturers in the district.

The association lasted for about six years, and although all the desired aims were not attained, nevertheless the periodical meetings gave an opportunity for the exchange of ideas looking towards the betterment of the industry "within our borders," and it can be said that the life of the association was not spent in vain.

The following companies were members in 1890, and it is believed that the roster of members did not materially vary during the life of the association.

The Royal Salt Co.,	Gouinlock & Humphrey,
The Pearl Salt Co.,	The Le Roy Salt Co.,
The Miller Salt Co.,	The Bradley Salt Co.,
The Lackawanna Salt Co.,	The Empire Dairy Salt Co.,
The Warsaw Salt Co.,	The Hawley Salt Co.,
The Standard Salt Co.,	The Perry Salt Co.,
The Livingston Salt Co.,	The Duncan Salt Co.,
The York Salt Co.,	The Castile Works,
The Crystal Salt Co.,	The Genesee Salt Co.,
	The Kerr Salt Co.

NATIONAL SALT COMPANY

The above company was incorporated under the laws of New Jersey on March 18th, 1899, with the avowed intention to control the salt industry east of the Rocky Mountains.

With this end in view, the following plants operating in New York State were purchased at the time of incorporation:

Bradley Salt Co.....	Warsaw, N. Y.
Empire Dairy Salt Co....	"
Hawley Salt Co.....	"
W. J. Gouinlock.....	"
Warsaw Salt Co.....	"
Cayuga Lake Salt Co.....	Ludlowville, N. Y.
Glen Salt Co.....	Watkins, N. Y.
Ithaca Salt Co.....	Ithaca, N. Y.
Kerr Salt Co.....	Rock Glen, N. Y.
Le Roy Salt Co.....	Le Roy, N. Y.
Pavilion Salt Co.....	Pavilion, N. Y.
Pearl Salt Co.....	Pearl Creek, N. Y.
Silver Lake Salt Co.....	Perry, N. Y.

The National Salt Co. also acquired the business of the National Salt Co. of West Virginia, which company was the distributor of the finished product of the above thirteen concerns prior to the consolidation.

The companies acquired, transferred to the new company their good will, patents, plants, trade-marks, and all their visible tangible real and personal property, under certificates that they were free of all indebtedness, secured or otherwise, and in payment for same agreed to take not less than 55 per cent. in stock of the new company and the balance in cash.

The authorized capital of the National Salt Co. was \$12,000,000, of which \$5,000,000 was 7 per cent. non-cumulative preferred stock. Par value of shares, \$100 each. The following officers and directors were chosen:

OFFICERS

President.....	Archibald S. White
First Vice-President.....	George W. Young
Second Vice-President.....	Frank Kerr
Third Vice-President.....	Joy Morton
Secretary and Treasurer.....	John Alvin Young

DIRECTORS

A. S. White, President of the company.
George W. Young, President U. S. Mortgage & Trust Co., New York.
Joy Morton, of Joy Morton & Co., Chicago.
F. B. Squire, of Standard Oil Company of Ohio.
John Alvin Young, Secretary of Atlantic Trust Co., New York.
N. S. Beardslee, manufacturer, Warsaw, N. Y.
Warren W. Hawley, manufacturer, Warsaw, N. Y.
W. C. Gouinlock, manufacturer, Warsaw, N. Y.

Mark W. Maclay, merchant, New York.
Samuel T. Kerr, merchant, Philadelphia.
Edwin Hanson, banker, Montreal.
Oscar L. Hubelman, Treasurer Commercial Trust Co. of N. J.
Frederic F. Culver, attorney, New York.
Walter S. Eddy, President Michigan Salt Association,
Saginaw.
Frederick R. Blount, President Lone Star Salt Co., Dallas,
Texas.

In October, 1899, the National Salt Co. acquired the salt-producing plants in Ohio and also closed contracts with the leading salt concerns in Michigan and other States, thereby giving it control of practically all the salt manufactured in the United States east of the Rocky Mountains.

The company did fairly well for a few years, but over-production, bad business methods, ruinous contracts and "high finance" soon began to tell and to make short a long story of litigation, etc., the company was finally forced into bankruptcy during September, 1902. Nathan S. Beardslee, the last president of the company, and Frank P. McDermott were appointed receivers. After some further litigation the assets of the National Salt Co. were sold at receiver's sale, after several postponements, on May 25, 1904, and the properties were purchased by the International Salt Co., an organization incorporated in August, 1901, for the purpose of purchasing the stock and assets of the National Salt Co. and continuing the salt industry in the East on a sound business basis, which it has done ever since.



Chapter XI.

INTERNATIONAL SALT COMPANY AND INDEPENDENT SALT COMPANY.

AS already mentioned, the above company was organized in August, 1901, for the purpose of purchasing the stock and assets of the National Salt Company and combining them with salt properties already owned by the International. The accomplishment of these aims served to reinstate the salt industry in the east on a sound business basis after the plight it had been thrown into by the failure of the National Salt Company in 1902.

Mr. Edward L. Fuller of Scranton, Pa., was the first president, and a large stockholder, and it was due to his exceptional business ability, that the International Salt Company prospered and took an important position in salt annals.

Mr. Fuller died on January 28th, 1909, and his son, Mr. Mortimer B. Fuller assumed the office of president. Under Mr. Mortimer B. Fuller's able leadership, the company has greatly expanded until it now occupies an unassailable position as the largest and greatest salt company in the United States.

The additional officers and directors of the company have also contributed in no small measure to its success, and as such we take pleasure in mentioning the late Mr. Milo M. Belding, Sr., who was connected with the organization since its inception, and who gave to the company his ripe business experience which had made his name a synonym for success in other lines of industry. Mr. Milo M. Belding, Jr., Vice-President, is a gentleman who has upheld and added to the traditions of the Belding name, and his connection with the International Salt Co. has been of great benefit. Mr. William H. Barnard has filled the difficult and responsible position of Secretary and Treasurer since the organization of the company, and his talent and aptitude for business dealings of large magnitude has been evident. Mr. Charles L. Paar, a veteran in the manufacture and distribution of salt, has filled the office of Sales Manager for many years, and the esteem which the trade holds for the company is due to his efforts and accomplishments in the distribution of the finished product.



INTERIOR OF RETSOF MINE
Retsof, Livingston County, N. Y.

The International Salt Co. now owns and operates the following mines and evaporating plants throughout the eastern part of the United States: The Retsof Mine, at Retsof, N. Y.; the Detroit Mine, at Detroit, Mich.; and the Avery Mine, at Avery Island, La., all three of which produce mineral or rock salt. The evaporating plants include the Cayuga works at Ludlowville, N. Y., and the Glen works, at Watkins, N. Y., both of which are of the highest type of construction possible to salt architecture, and in size, each equal to several plants of ordinary dimensions. The Genesee and Wyoming Valley Railroad is also controlled by the gentlemen of the International Salt Company, and serves to connect the mineral salt district with the trunk line railroads.

As is commensurate with the standing of the company, the quality of the salt mined or manufactured by the International Salt Co. is superior to any made in this or other countries. Ample capital and the utilization of the most modern and efficient methods of production make this possible and the enormous amount of business done by the company and its thousands of satisfied customers are proof of this assertion.

For the history and description of the several plants belonging to this company within the borders of New York State, we would refer the reader to the various chapters of this work, where a detailed account of them will be met with.

INDEPENDENT SALT COMPANY

The Independent Salt Company was incorporated during September, 1904, and consolidated the following firms of salt packers and dealers: Hoag, Werner & Co., F. J. W. Bursch Company, and Edwin Ferris & Co.

Chief among these was the large firm of Hoag, Werner & Co., which had been engaged for many years in the business of packing bulk salt into commercial sizes and the selling of all grades of both imported and domestic salt; also the manufacture of free-running table salt.

Owing to the fact that salt works are invariably located at some distance from the great selling marts of the country, it has generally been the custom to intrust the distribution, sale and delivery of the product to selling organizations equipped for the efficient packing, storage and delivery of such a heavy and bulky article as salt is. Waterfront storage warehouses, elevators, and barge equipment for the efficient and cheap transportation of the salt from the works via canal and river, also a numerous fleet of trucks for delivery purposes are essential to the industry, and for the above very evident reasons the distribution and sale of salt has generally

been in the hands of separate selling organizations. This system is also employed by other lines, such as coal, flour, steel products, oil and other goods, and the wisdom of the plan is evident in the great industrial expansion of the country.

A separate selling organization also leaves the manufacturer or miner free to devote all his energies towards the production of his commodity and the invention or development of improved methods of manufacture.

The above facts are doubly evident when applied to the great metropolitan center of New York City, the heart from which the arteries of commerce radiate to all parts of this broad land and the outside world. The firm of Hoag, Werner & Co. had long been the chief distributors of salt in New York City, handling tonnage from most of the New York State plants and also doing a thriving trade in imported salt. It was therefore natural for the Independent Salt Co., an outgrowth of this firm and others, to immediately take a predominant position in the territory dominated by our great city. From the day of incorporation up to the present the company has expanded, until now it is by far the largest and most efficient salt distributing organization in this country, if not in the world.

A large part of this enviable reputation is due to the untiring efforts of Mr. Luther M. Werner, president of the company, who for thirty-five years, or in other words, during his entire business life, has been engaged in the salt business, first as partner in the firm of Hoag, Werner & Co., and later as organizer and president of the Independent Salt Co. Mr. Werner is often spoken of as having as keen an insight and grasp of the salt business in this country as any man living.

Charles J. Werner, author of this book, occupies the position of vice-president; William J. Porter is secretary and treasurer, and James J. Hayes assumes the duties of assistant treasurer.

Three large waterfront warehouses and packing establishments are maintained within the confines of the greater city. The main plant is situated at Wallabout Basin and Washington Avenue, Brooklyn; a second establishment is located at Gowanus Bay and Hamilton Avenue, Brooklyn, and the third branch is at Harlem River and 136th Street, New York. The company makes its own bags and operates a factory for this purpose at Second Avenue and Fifteenth Street, Brooklyn.

The executive offices are located at 44 Whitehall Street, New York, where a large force of clerks and executives transact the business of the company.

The Independent Salt Company deals in every grade of salt manufactured and for all purposes. Its warehouse facilities admit of immediate delivery of large quantities of all grades of salt, which is of signal advantage in these days of industrial expansion and increased export trade. A large share of Government orders, both Army and Navy, find their way to the Independent Salt Company, for here can be obtained prompt delivery, highest grade salt and careful attention to specifications.

The Independent Salt Company has handled the tonnage of the International Salt Company for many years in the New York district and surrounding territory, and this combination of largest manufacturer and largest distributor has been of inestimable benefit to salt users. Tonnage from several other companies, among which may be mentioned the Sterling Salt Co., Watkins Salt Co., Le Roy Salt Co., Rock Glen Salt Co., and Onondaga Coarse Salt Association, is also disposed of, and those grades of imported salt which find favor in this market are also kept in stock.



Chapter XII.

GRADES OF SALT

THE following grades of salt, both evaporated and mineral, comprises all kinds of salt that are now manufactured in New York State or other parts of the country.

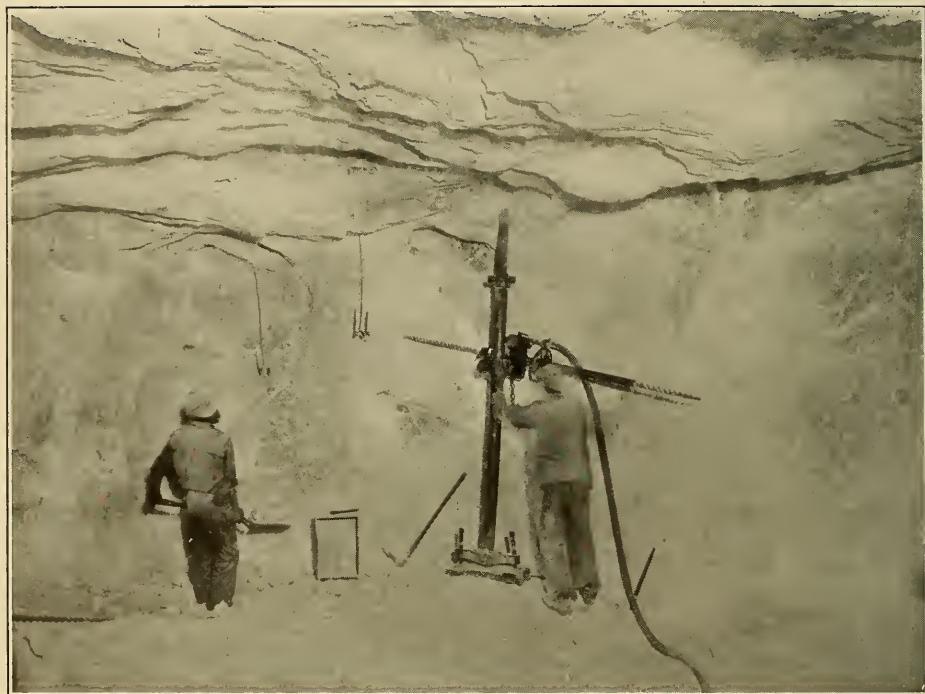
As outlined in previous chapters of this work, evaporated and mineral salt both originate from the same strata of rock salt, the difference being in the method of obtaining the product. One exception must be made to this statement however, namely the source of supply for the works at Syracuse. These wells do not arise from a strata of rock salt, but rather from leechings and leakage from the rock salt beds at Tully Hills, about seventeen miles south of Syracuse. Several attempts have been made to reach rock salt at Syracuse, but without success. The quantity of salt made at this city is very small, and growing less yearly.

Evaporated salt, which is manufactured in larger quantities and more generally used than mineral salt, is evaporated from saline brines, either in open or closed vessels, or by the sun's rays, which latter method is fast becoming extinct. The brine is obtained from wells driven down to the salt strata. In some of these water is present and serves to dissolve the salt and produce a brine without assistance; in others an outside supply of water must be forced into the well, there to do the work of dissolution. The brine is pumped from the well to the evaporating plant. When evaporation is complete the salt is dried and refined or purified.

DESCRIPTION OF GRADES OF EVAPORATED SALT COMMON SALTS

Vacuum common fine salt is the first product of the closed or vacuum pan (evaporator) before any process of refining. It is a fine, even-grain salt and a standard for manufacturing, salting or refrigerating purposes. Also used in some parts of the country for food purposes, where price is important and quality not essential.

Grainer common fine salt is a product of open pans or grainers and is coarser than vacuum common fine. It is used generally for the same purposes, but where a fine, even grain is not essential.



MINING SALT AT THE RETSOF MINE

Retsof, Livingston County, N. Y.

Ground alum salt is made by the same process as grainer common fine, but considerably coarser.

Diamond F coarse salt is the coarsest evaporated salt made and is preferred by some manufacturers, refrigerators and meat packers.

REFINED SALTS

Table or Dairy salt is a high grade granulated product of the evaporator, especially refined for table, cooking or dairy use. It is strictly pure, white, clean and dry. Sparkles like a diamond, the result of perfect crystallization, makes a brine as clear as crystal and does not harden.

Free Running Table Salt is the above grade to which 1-10 of 1 per cent. of carbonate of magnesia or other chemical is added to insure free-running qualities under adverse conditions of climate, care, etc. The admixture of the very small quantity of magnesia does not destroy the agreeable saline flavor, but permits the salt to run freely from the shaker at all times. Generally packed in moisture-proof containers.

Standard Fine Salt is used where a high grade article is needed for manufacturing, salting or refrigerating purposes and where a good plain grade of table salt is wanted.

Agricultural Salt is any of the above grades of salt that have become discolored or dirty. It is used for fertilizing or any other purpose where a waste product can be used.

MINERAL SALT.

Mineral salt is rock salt, mined directly from the strata of natural rock salt which underlies certain portions of the earth's surface. The method of mining is similar to coal, with shafts, galleries, cross cuts, etc.

The salt is broken off by means of explosives, drills or hand power, and carried to the top of the shaft in the form of large lumps, where it is crushed to the desired size in a building called the "breaker" or head house.

All mineral salt is the same in quality, the different grades simply denoting various sizes.

Mineral salt has no equal for certain uses. It is the natural salt, hard, compact and not easily dissolved as compared with evaporated salt. For these reasons it is a perfect refrigerating article and also excels for making brines, pickles, etc. Mineral salt stands in a class by itself for preserving and curing meat and fish, as it lasts longer and its rock-like form makes for a perfect contact. Hides and skins are also more perfectly preserved by the use of mineral salt. Certain chemical processes also employ it to advantage. In certain

countries where evaporated salt is not available, mineral salt is finely crushed and used as an edible. It is not put to this use in any part of the United States, however.

DESCRIPTION OF GRADES OR SIZES.

F.C. (Fine C.) is about the size of coarse granulated sugar.

C.C. (Coarse C.) is about the size of a grain of rice.

No. 1 is about the size of a small pea.

No. 2 is about the size of a large pea.

No. 3 is twice as large as No. 2.

SOLAR SALT.

Solar salt, as the name applies, is evaporated by the sun's rays in shallow troughs to which the brine has been pumped. The manufacturing of solar salt in modern times has always been confined to Syracuse, in Onondaga County, where large quantities of it were formerly made. The industry to-day is but a shadow of its former proportions and the tonnage is growing less every year.

Solar salt is generally of a coarse grain, although many years ago, some portion of the output was ground into table salt.

What little is now made is used for the same purposes as other coarse salts.

DESCRIPTION OF GRADES.

Standard Coarse Salt is the salt as it comes from the vats or troughs.

Diamond C. is composed of the coarsest crystals of the Standard Coarse, and is separated by screening.

Diamond B. C. is composed of the second size crystals, separated in the same manner.

Diamond F. is what remains after separating the Diamond C. from the Standard Solar, by screening.

Diamond B. F. is the next finest grade.

Fine Screened Diamond B. F. is Diamond B. F. re-screened.

Ground Solar is Diamond F. or Diamond B. F. ground to the requisite fineness.

No. 2 Solar is second grade Standard Coarse Salt, slightly damaged by dust from railroads, etc., and is used in places where cleanliness is not essential.

The above grades were those made when the solar industry was at its height many years ago. Some of these grades have been discontinued, and others made only at intervals.

NEW YORK

SCALE OF MILES

0 10 20 30 40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

40

</

SOUTHEASTERN MASSACHUSETTS UNIVERSITY
TN903.U5 N77 1917
A history and description of the manufac



3 2922 00083 753 1

TN 903

05

N77

1917

70301

